THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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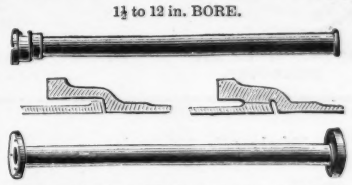

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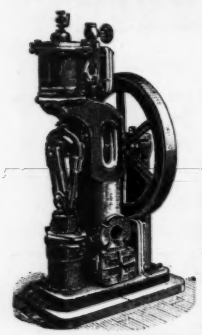

Fig. 705. "SINGLE RAM" STEAM-PUMP.

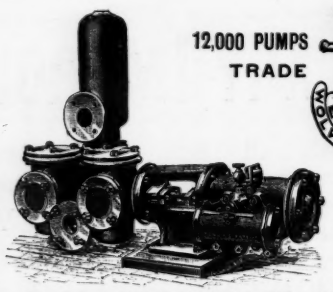

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

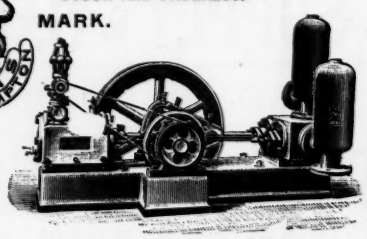

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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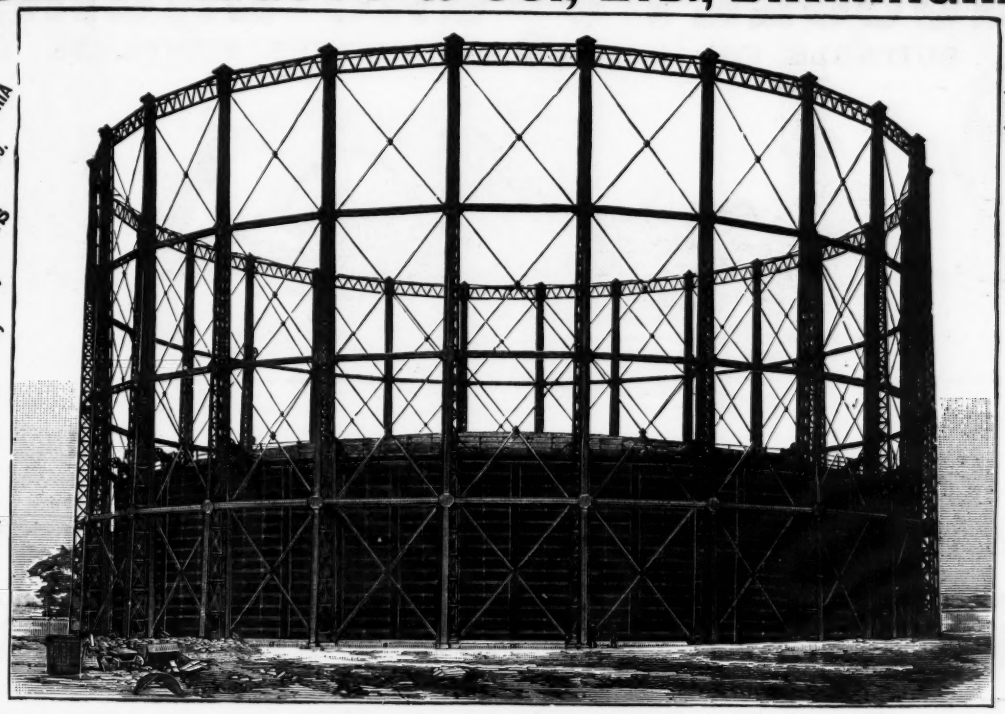

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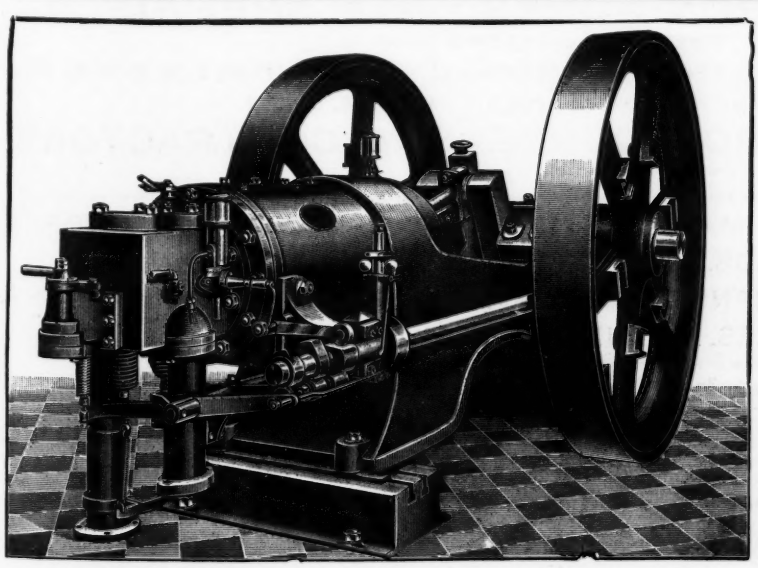

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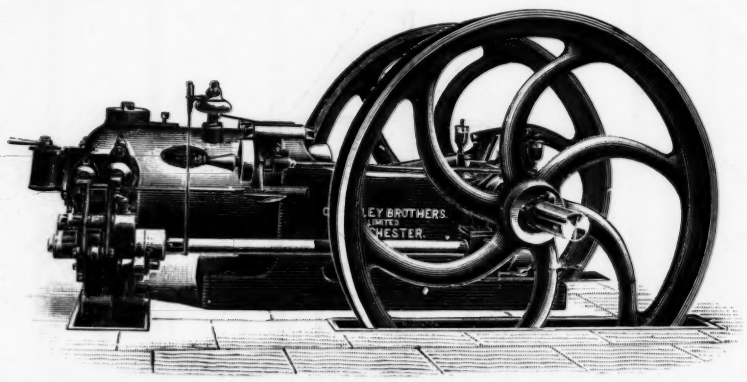

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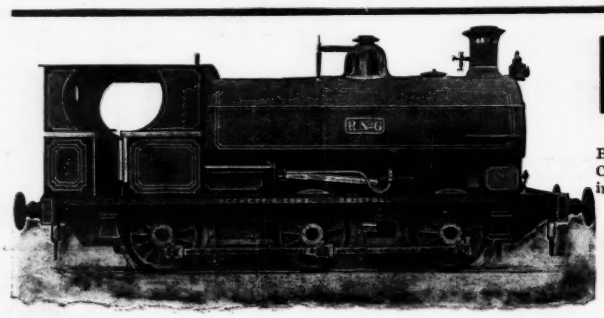

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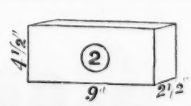

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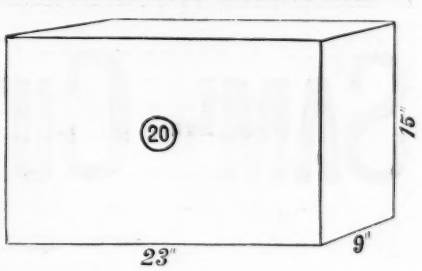

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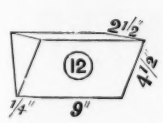

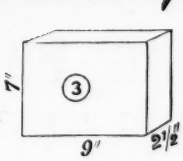

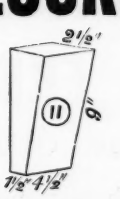

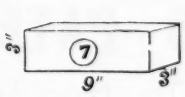

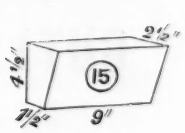

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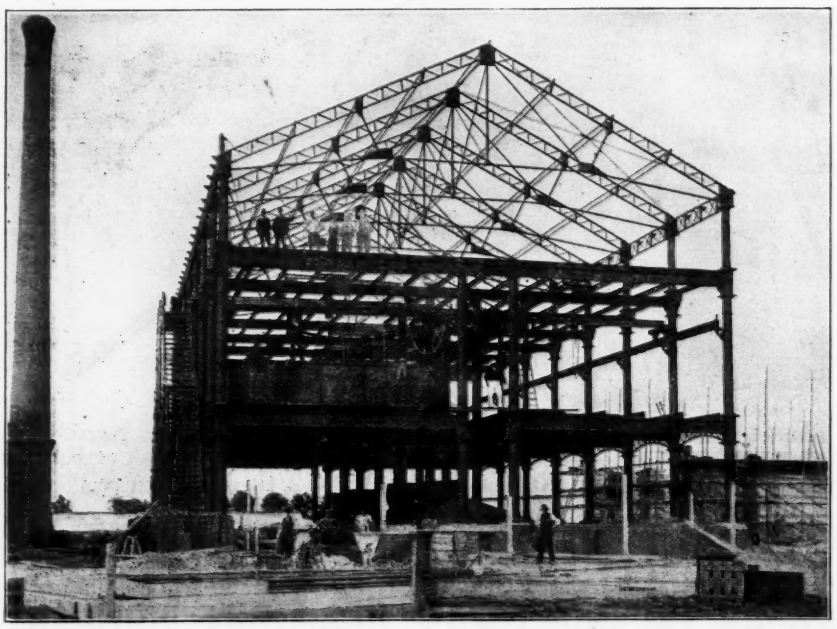

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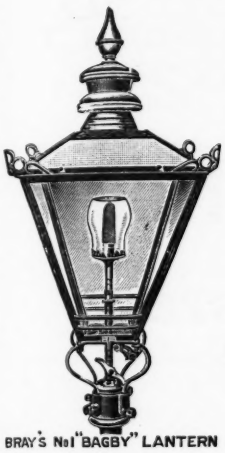

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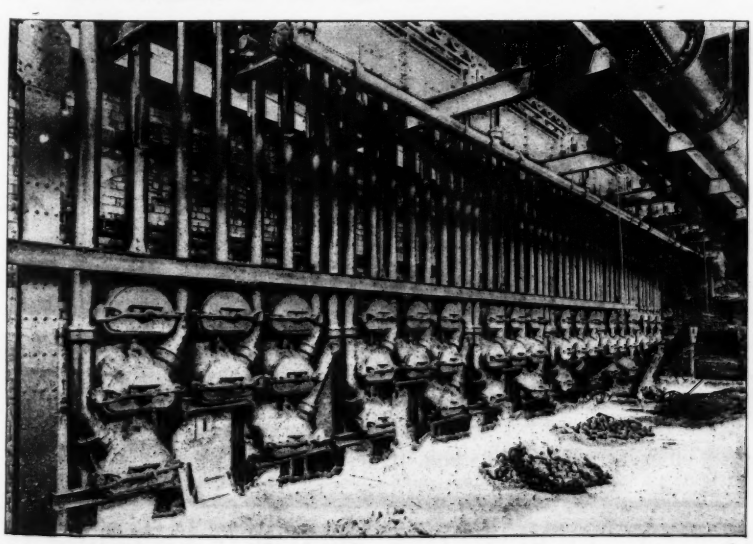

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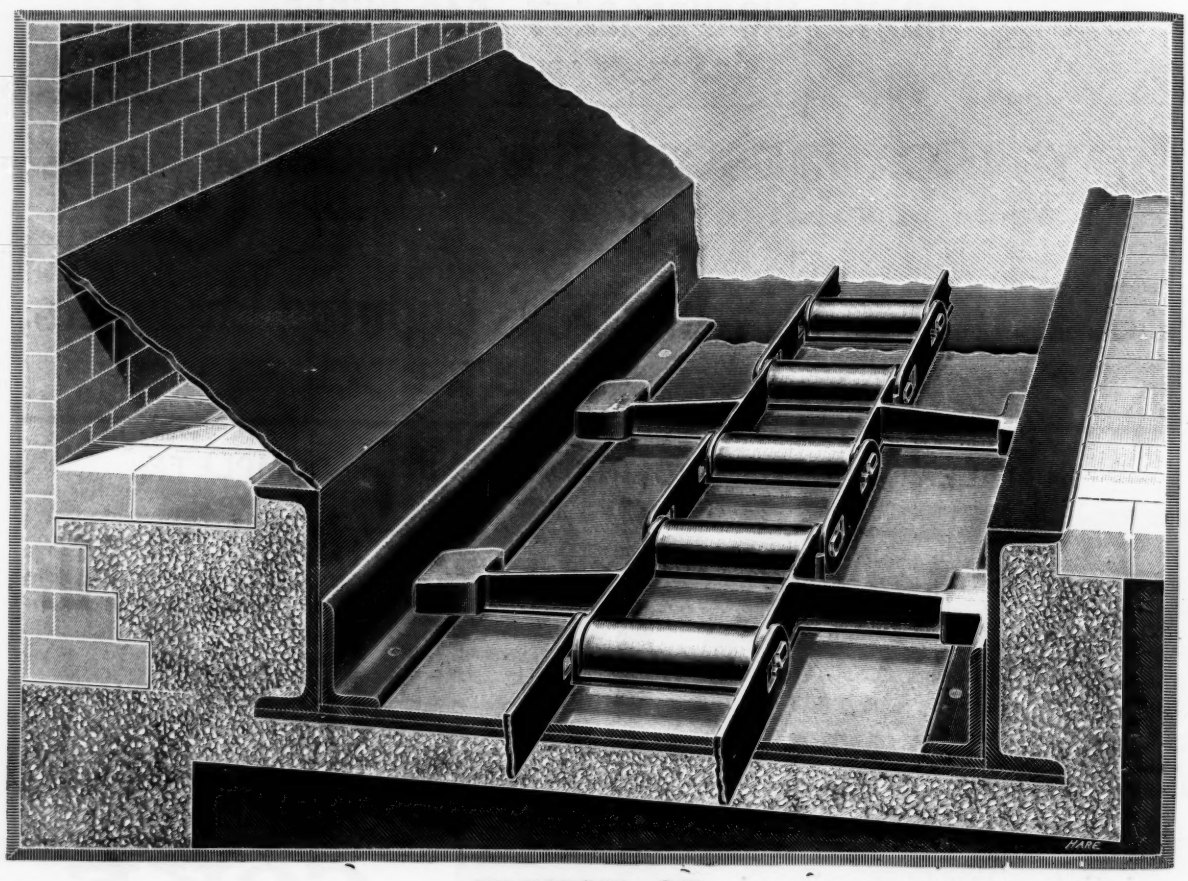

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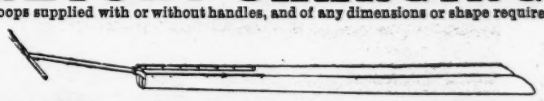

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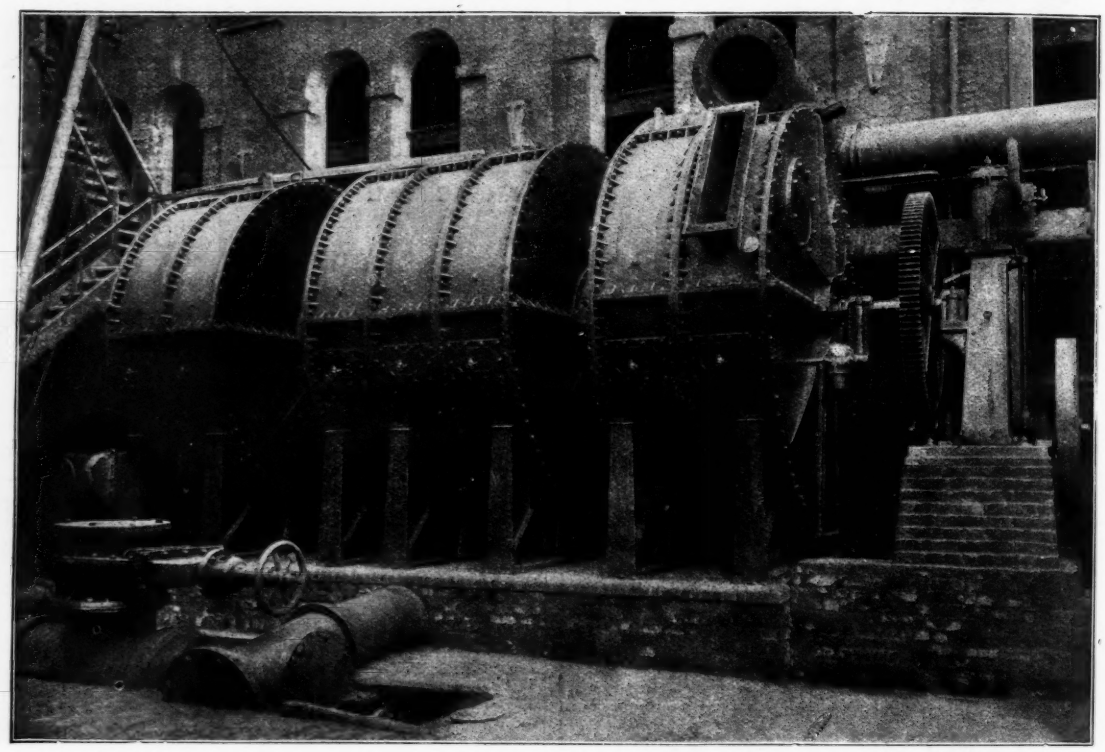

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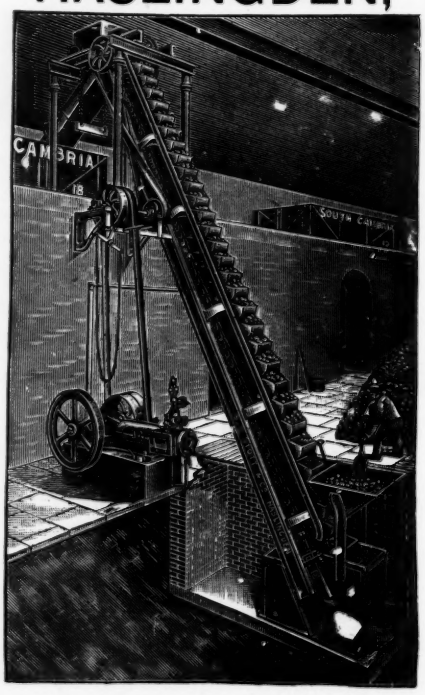

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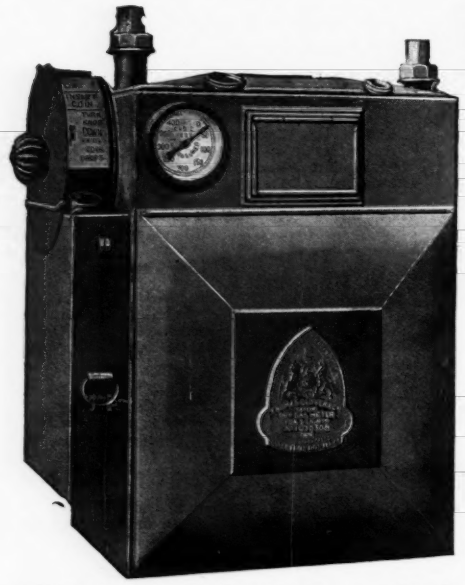

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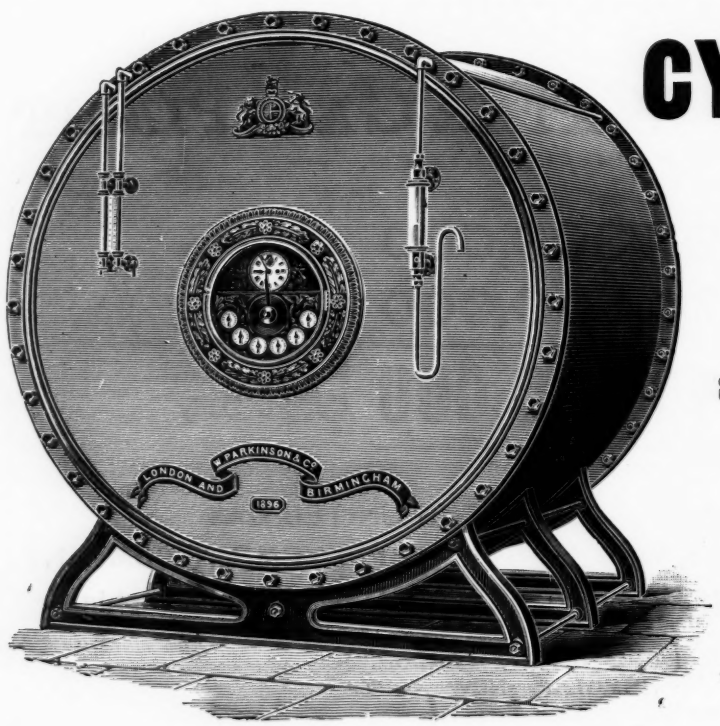

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EDITORIAL NOTES.

The Law of the Payment of Back-Dividends.

IT seems very remarkable that it should have remained to the present day for the law relating to the payment of back-dividends by statutory companies to be definitely laid down by the House of Lords. Such is the fact, however. A report of a judgment on the subject will be found elsewhere; and its importance for the older order of Gas Companies as well as Water Companies is obvious. So long as an undertaking of this description continues in the old proprietors' hands, questions of the legality of back-dividends and the prospects of future profits may rest in abeyance; but when the time comes for the compulsory expropriation of these owners, they have to be disposed of. In the present instance, the issue was raised by the Kent Water-Works Company, in terms which are too voluminous for repetition here. Briefly stated, however, the question for the Courts was whether the Company were entitled to make up deficient back-dividends from the date of their earliest Act, which was obtained in the year 1809, long anterior to the enactment of 10 per cent. maximum dividends, which were first legalized by the Water-Works Clauses Act, 1847. For many of these early years' there were no dividends at all, or very small ones. The Company did not come under the Act of 1847 until 1864, when there was an amalgamation to be sanctioned; and it was then enacted that the Act of 1847 should be incorporated with the Act of that year. Previous to 1864, the original Kent Water Company were not under any restriction as to the amount of profits which might be distributed among the shareholders; but, as a matter of fact, these profits had never amounted to a dividend of 10 per cent. upon the paid-up capital for the time being. It was not until 1883 that the Company found themselves for the first time in a position to divide more than the statutory dividends of 10 and 7 per cent.; and the superfluity began to be applied to the payment of back-dividends as from 1864. These deficiencies being cleared off, in the beginning of the present year the Company proposed to extend the process farther back, and so make up the deficient dividends of previous years to the maximum rate then enacted. Thereupon a present holder of 7 per cent. stock objected; and the objection was sustained both by Mr. Justice Joyce and by the Court of Appeal. The Company took the case to the House of Lords, and the judgment of the highest tribunal is emphatically the same as that of the Courts below. The appeal was accordingly dismissed. All the Law Lords agreed with the view that it is only the statutory enactment of a maximum rate of dividend which creates the possibility of "deficient" dividends. Only where there is a standard, can there be any shortcoming. Consequently, the Company are not entitled to go behind their Act of 1864, by which they came under the benefits as well as the restrictions of the Act of 1847. This is to set a very much higher value on the Act than some have hitherto attached to it. Henceforth, in the ultimate valuation of statutory gas and water undertakings for transfer to public authorities, this rule as to the date of the legal payment of back-dividends will prevail, to the final composure of many doubts.

A Tariff Commission.

THE latest development of the Tariff Reform movement is not without some interest for the gas industry of the United Kingdom. A body of manufacturers and traders has been got together, with the object of reducing to form and detail the general proposals for a resettlement of the fiscal system of the country on the basis which has already been indicated by Mr. Chamberlain. It will be the particular task of these Commissioners to investigate the bearings of the general proposal to tax foreign manufactures, upon the various industries and commercial interests of the kingdom—or, rather, of the British Empire. As regards the proposed taxation of foreign manufactured imports into this country, it will be remembered that there are at least two suggestions before the public, which may or may not be equivalents of one another. Mr. Chamberlain's suggestion, which is the more definite, is for an import duty of 10 per cent. *ad valorem* on such articles as could be manufactured in the country. The other is for making such articles bear a duty equal to the amount of the rates and taxes which similar home produce would bear.

The difficulty of constructing a tariff on the lines here indicated, or either of them, consists in observing the rule, upon which everybody is agreed, that there shall be no taxation of imported raw materials of manufacture. This involves discrimination in the cases of such partially manufactured articles as are the raw materials of further manufacturing processes. It is asked, for instance, to which class of imports gas oils belong? This is the first point at which the proposed inquiry touches the gas industry; and it is a matter that the Institution of Gas Engineers might look to. There is no special representative of the British gas industry in the first list of the Commission. Sir William T. Lewis or Sir Alfred Hickman, M.P., might extend a benevolent wing over the industry; and there is only one gas director in the list, Mr. J. H. Birchenough, who is on the Board of the Imperial Continental Gas Association. The only course to be taken, therefore, is to make sure that the case of the gas manufacturer is fairly put before the Commission in the ordinary course of the inquiry. We can scarcely think, however, that it can be intended to place an import duty on any kind of burning oil, though the opportunity for suggesting it will severely strain the Free Trade principles of the Scottish oil producers. The tar trades will also have something to say.

At the other end of the scope of the industry, in the matter of incandescent gas-burner and mantle manufacture, there appears to be another case for investigation. During the last year or two, the remarkable phenomenon has been presented of a considerable establishment of this new manufacture in this country. A proposal, therefore, to clap an import duty of 10 per cent. on foreign-made burners and mantles would not be unwelcome to the bulk of the trade; at least, so one would be led to think by the facts as stated. There has always been a large manufacture of the highest class of these goods in England; and it might even be thought that this is an occupation which would answer well in Ireland. It would be such a good thing if the present drastic reconsideration of the elements of industrial welfare resulted in the increase of decently-paid employment in Ireland. At any rate, the point is not one that can be safely ignored.

The Welsbach Company's Capital Reduction and Reorganization Scheme.

No extenuating circumstances can be found to justify the action of stockholders representing only one-sixth part of the preference stock of the Welsbach Company in flouting the judgment of all their fellow-shareholders by putting every possible obstacle they could—even to the prosecution of litigation up to the Court of Appeal—in the way of the consummation of the capital reduction and reorganization scheme, which time and again had been agreed to be the one thing essential for the salvation of the concern. The huge majorities of shareholders in favour were not sufficient to satisfy these comparatively few preference holders; nor was the confirmation of the scheme by Mr. Justice Buckley. It has required nothing less than the unanimous verdict of three Lords Justices to give them their *quietus*.

It may very properly be argued that the malcontents were well within their rights, and that, no matter by what majorities the scheme had been sanctioned, no obligation rested upon the Courts to confirm the scheme. But the facts pointing to the necessity of relieving the Company from that substantial portion of their capital which formed

a veritable incubus, were so stupendous that the efforts made to overthrow the scheme cannot be defended by the mere statement of the possession of the right to obstructive action, nor by the absence of any confirmatory obligation on the part of the Courts. Wisdom permeates the declaration on this point of Lord Justice Stirling that, "when they [the Court] found that the deter- "mination of the question as to the rights attaching to "different classes of shares had been left to be decided by "the shareholders themselves, the Court ought to be very "careful not to interfere with the *bonâ-fide* judgment of busi- "ness men." We do not have to go far back in the history of joint-stock companies to find out that the preference shareholders of the Welsbach Company will, with the carrying through of the scheme, be among the least of the sufferers who have been preference holders in unfortunate or mismanaged industrial enterprises; and therefore the argument that, by the sanctioning of the scheme, the holding of preference shares will become more hazardous than it has hitherto been considered, is extremely feeble. The future of the preference holders in the Company is to-day more promising than it has been for many a year.

However, as the Courts have now so conclusively endorsed the scheme, the appellants have signified their intention of not going to the House of Lords. This is the most prudent resolution they have made in this matter since their first egregious blunder in connection with it. The Directors will now be at liberty to give effect to the mandate of the great majority of the shareholders. Naturally, this will take time; but—and this is the end of the scheme—it brings the day of the return to dividends within measurable distance.

Cut-Throat Municipal Competition with Gas Companies.

THE question of the cut-throat competition with gas companies by local authorities supplying electric power at the price of 1d. per unit, has often proved the subject of comment in these columns. So far as can be ascertained, gas companies who are able to sell gas for consumption in engines at anything below 2s. 3d. per 1000 cubic feet, or thereabouts, seem to be content to let these municipal rivals of theirs make the very best they can out of their penny units. It is the rooted principle of gas supply finance, that no single consumer, or class of consumers, ought to be favoured with gas at less than its cost price; and we have certainly never advocated such a practice. What we have counselled is, wherever possible and expedient, the approximation of the prices charged to specially good customers to the cost of their supplies—a totally different thing. What is now understood as the "flat rate" system of pricing a gas supply is no longer regarded as either fair or businesslike, in the ordinary conditions of the trade as carried on. This does not cast any reflection on the older policy of charging one price for gas in a district, which was good business only so long as there was not a great difference of demand among the customers on the rental-books. As such differences arose, so the hard-and-fast rule of the uniform price fell into discredit, until at the present day it has been abandoned almost everywhere. Even the old-fashioned undertakings which make a strong point of having no discount system, whether for special kinds of consumption, large accounts, or prompt payment, demand a higher price than the ordinary one for slot-meter consumption. If this is not a differential charge, we should like to know what is. And when a gas company who charge an excess slot-meter rate of 10d. per 1000 cubic feet—quite justifiably—profess to be unable to allow reasonable cash discounts or special rates for exceptionally good custom, it can only be concluded that there is something wrong at headquarters.

To resume, however, the main line of the argument, which is that gas ought to be offered to all and sundry classes of consumers at the lowest prices possible in the circumstances, consistent with avoiding unfair preference: It is becoming increasingly evident that municipal trading knows no such rule. We recently had occasion to mention the exceedingly clever report of the Cheltenham Electrical Engineer upon the economics of the local electric power undertaking, in which the existence of the practice of selling portions of the municipal product under cost was amply established. If treated in the same way, most of the electric power business of local authorities would come out in the same category. This, however, is not all; there is more behind, as appears plainly enough in reference to the electric lighting affairs of the Corporation of West Ham. This authority, which has one of the heaviest-rated districts in England, has spent very nearly £200,000 on the electricity supply undertaking, which has been working for five years. During this period the magnificent sum of £11,000 has been paid off the loan, and a reserve fund of £1764 has been "built up," as a contemporary puts it. The expression is good. Better still, the reserve fund is described as "gradually being built up." Very gradually indeed. Meanwhile, West Ham takes credit for having given "special inducements to the occupants of "artisans' dwellings to use the electric light"—the artisans' dwellings, of course, being owned by the Corporation. The nominal charge is 4½d. a unit. The total revenue from this source last year was £126, out of which special expenses amounting to £51 were paid; leaving £75 for the current consumed, which works out to less than 3d. per unit. This was considerably under cost; and it furnishes a striking illustration of the "way not to do it." Naturally, the public lighting in this area was done in the same businesslike spirit; being charged at about 1¼d. per unit, when it must have cost more than double.

That this kind of thing is fair and legitimate competition with a Gas Company, is a proposition we should like to see sustained by argument. In the circumstances, the West Ham Gas Company do not complain, for their annual increase in consumption is as much as they can manage, and not a customer of theirs is charged for somebody else's gas. Probably the local public know this, and are not averse from paying a fair price for a good article. Still, whatever the scale upon which the unfairness is perpetrated, the charging of slot-meter consumers of electric light at something less than 5d. per unit, while the initial rate for ordinary private consumers is 7d., is not fair dealing. Nor can such exceptional treatment of the Corporation tenants be legal. The story is told here merely in order to show the kind of thing that some gas companies have to put up with at the hands of the local authorities—paying, the while, as unrepresented ratepayers, for the privilege.

The State of the Mineral Oil Trade.

MUCH interest is being manifested in the immediate future of the mineral oil industry (as to which we have lately had some observations to offer), arising out of the recent increased prices asked for gas oil. The difficulty experienced by the British gas manager in regard to this matter of oil prices is, in the main, that of the uncertainty of the trade. He feels himself liable to be hit by the trade in two ways: If coal goes up, oil invariably follows suit, by virtue of the operation of the economic law of equivalent supplies. On the other hand, oil may likewise go up for reasons peculiar to itself, and not connected with coal at all. At the present juncture, for instance, oil has risen in price in consequence of particular causes which are in the last degree most mysterious. It has been reported that the main sources of the American supply, which, by reason alike of its quality and abundance, has ruled the markets of the world, are not increasing commensurately with the growth of the universal demand. The yield of the existing oilfields appears to be at a standstill, which means that all the increased demand must be supplied from other sources. It has even been said by pessimistic reporters that the older and the best of the American fields are now failing; but this statement is not borne out by the statistics. On the other hand, the heightened interest alleged to be shown by the Standard Oil Company in certain Old World sources of oil may be taken for what it is worth. With capable management and honest administration, the Roumanian field may yet repay cultivation.

The waxing fortunes of the English Companies holding oil properties in Russia inspired the "Daily Telegraph" on Saturday last to devote a column article to the subject. Amid a good deal of empty verbiage, the writer contrives to register a few pertinent observations which are deserving of attention. He appears to expect the outbreak of sharp hostilities on the Continent of Europe between the Standard Oil Trust and the "Kartels," from which the Russian exporters may reap a substantial advantage. They need it. A year ago, the value of crude oil at Baku was not more than 7 copecks per pood of 36 lbs. To-day it is quoted at 12 copecks, at which price all the producing firms ought to be able to realize a handsome profit. This price does not necessarily mean that "Solar" oil will be dear. The

"Daily Telegraph" is of opinion that if oil is coming into increased use as fuel as well as for lighting, the shares of the leading Russian Petroleum Companies "may be worth "attention." It must not be overlooked, however (as we have been careful to point out for the behoof of those whom it may concern), that the use of fuel oil is wholly a question of price, and that of gas oil is like unto it, with a somewhat higher range.

The Lamp-Posts of Waterloo Bridge.

COMMENT has often been offered in these columns upon the hopeless Philistinism of the treatment of the streets and open spaces of London in the matter of the public lamp-posts. During the past week, a recruit for our side appeared in the pages of the "Daily Graphic," which has given publicity to a burst of righteous indignation over the maltreatment in this regard of Waterloo Bridge, at the hands of the London County Council. Some time ago, we had occasion to protest against the vandalism of the quacks of Metropolitan Government who are well sheltered at Spring Gardens, in removing the characteristic old lamp-standards from the parapets of this noble monument, and substituting for them miserable skimpy electric light posts, which, with their disproportionate lanterns, looked like nothing so much as imitations of housemaids' brooms, stuck on end. Some artistic critics of the new erections also at the time went so far as to declare that a Deputy-Chairman of some obscure Committee of the Council must have "designed" them on these lines. For several years past the world-famous bridge has offered to view the gruesome spectacle of these puerile lamp-posts alternating with the old standards; but during the past weeks the gentlemen of leisure who are injuriously called the "workmen" of the County Council have been engaged, "in a manner of speaking," as they would say, in removing the remaining old standards, and completing the degradation of the bridge with the new posts. One would like to know who it is at Spring Gardens that has any warrant for thus impressing his own littleness of soul upon one of the most worthy and enduring of all the public works of the Metropolis. Some mannikin it must be, dressed in "a little brief authority," who plays this prank in the eyes of a scornful world, which wonders why Londoners are powerless to prevent the spoiling of even the few great monuments that they possess. The writer in the "Daily "Graphic" gives sketches of both lamps, in order that the disgusted public may see how low the standard of taste in these things has fallen, since municipal "Progress" was discovered. As he says, "Not only is the design of the old "lamp good as a design, but it is absolutely suited to the "design of the bridge." Of course, the change, which is not for the better, also means the outlay of a good deal of money, which is thus worse than wasted. Short of some leading artist personally smashing the lanterns and allowing himself to be taken to Bow Street for it, there is no means of bringing before the tribunal of public opinion a protest against this breach of trust by the County Council.

A Signal Victory over the Electric Light at Reading.

Congratulations to the Reading Gas Company. After a stiff fight (lasting some four or five months) between the Company and their electrical competitors for the new public lighting contract, and with electric lighting for a time a distinct favourite with many of the town councillors for the lighting of the tramway route, the Reading Town Council last Tuesday, without a dissentient vote determined to enter into a contract for the whole of the borough to be lighted by incandescent gas-lamps (see p. 759). The vote was one for efficiency with economy; and so commonsense has prevailed. The history of the matter has been followed closely in our pages; and the report appearing elsewhere discloses the final reasons that led the Council, after all, to prefer safety to uncertainty and economy to waste by the lighting of the tramway route, as well as the other parts of the borough, with incandescent gas-lamps. We believe that it would have cost something like £1200 above that of incandescent gas lighting to light the tramway route alone, on the cheapest of the eighteen alternative schemes submitted by the Electric Lighting Company. However, the contest has been won, as we hoped it would be, by the Gas Company; and electric arc lighting has been beaten on all points. Of course, there will now be a considerable amount of work to be done by the officials and staff of the Gas Company—particularly by the Engineer (Mr. D. H. Helps), who has taken a very energetic part in the fight—in connection with the laying of the new services on the tram route and the erection of the lamps in the heart of the town. But, once this has been done, of this we feel assured, that such attention will be paid to the maintenance and upkeep of the burners, that Reading will be one of the best and cheapest lighted towns in the kingdom—that is to say, cheapest for the amount of light obtained. The story of the fight and the result will be useful and encouraging to gas companies generally.

A Cheering Estimate.

The approximate estimate of the result of the working of the Nottingham Corporation Gas Department for the six months to Sept. 30, which was recently submitted to the Gas Committee, makes very cheerful reading for the consumers and ratepayers generally. It will be seen from the notice which appears elsewhere that this estimate has been prepared owing to the desire of Mr. J. H. Brown, the Engineer and General Manager, to have before him an accurate statement of each quarter's financial results, so as to check the effects of the various changes he has brought about. During the period referred to, there has been an increase of over 40 million cubic feet in the quantity of gas consumed, which has about balanced the reduction of 2d. per 1000 cubic feet which was made in the price last March. Residuals also show substantially improved returns; and praise is bestowed on Mr. Brown for his management of the chemical branch of the undertaking. An exceptionally good point in the report is that, roughly speaking, 75 per cent. of the additional output of gas was provided by a larger make per ton of coal. The net result of the six months' trading is an increased profit of £12,000; but the Chairman of the Committee was careful to point out that during the six months ending September, 1902, the works were not under the charge of any Engineer or Manager. At the time the previous reduction in price was intimated, it was announced that a further concession might shortly be made; and another reduction of 2d. per 1000 cubic feet, as from the commencement of the March quarter, is now foreshadowed. While bearing in mind the fact that untoward circumstances may arise to prevent the continuance of the present rapid rate of progress, it must certainly be most gratifying to the citizens of Nottingham (as well as to Mr. Brown) to learn that there is every reason to believe the current financial year will be the most favourable so far experienced in the history of the undertaking.

Continental Companies and Directors' Reports.

The proceedings at the meeting of the Continental Union Gas Company last Tuesday should cause the Directors of this and other Continental Gas Companies to give renewed consideration to the question as to whether—although there are good grounds for not publishing the accounts in detail—they might not circulate, for the information of proprietors, the report of the Board before a meeting. It is subsequently published *in extenso* with an account of the proceedings; and so it is impossible to see that any harm would ensue from prior circulation. When good profits and the ordinary dividends are being maintained, the shareholders are not greatly concerned; but when from any cause (as in this instance) the profits fall, and the dividend follows suit, then shareholders get somewhat disturbed. Yet if the position was briefly explained in the Directors' report, and issued before the meeting, the shareholders might attend in a far different frame of mind. The Chairman of the Continental Union Gas Company (Mr. Arthur Lucas), in effect, confessed to the same opinion in his opening remarks by saying: "Many of the proprietors must have come there that day feeling somewhat anxious about the affairs of the Company, in consequence of the reduction in the dividends. He trusted now that they had heard the report, a certain amount of the anxiety had been allayed." Why should not the proprietors have had their anxiety as far as possible allayed by publishing the report before as well as at the meeting? There are very good reasons, as already said, in a concern constituted and working in several places abroad, as this one is, for not publishing the complete accounts; but the Directors' report is another matter. However, there was certainly one thing the Chairman made

conspicuously clear at the meeting, and that is that some of the circumstances that have contributed to the lowering of the profits in the past year are only temporary, and against those which are permanent there is an excellent set-off in the remarkable growth in the number of the new consumers—particularly of the Union des Gaz. The Chairman's statement, in answer to a shareholder, in regard to the Municipalization Act and the friendly attitude of the Italian Government, is also very reassuring.

Benzol Enrichment.

In further reference to "Gas Examiner's" letter in last week's issue, on the subject of the permanency of benzol enrichment, and the few editorial comments upon the communication, we learn definitely that it is as we supposed—that, under the changed circumstances, the Gas Committee of the Leeds Corporation took no further steps in the matter of testing the question of the travelling power of this form of gas enrichment. In 1901, the Committee were compelled, owing to the scarcity of cannel, to use benzol largely for enrichment, but for some time past, with cannel cheap and plentiful, and the carburetted water-gas plant at work, it has not been deemed necessary to resort to the use of benzol, excepting to a limited extent, and consequently no tests have been made. So far as Leeds is concerned, this explanation must suffice for "Gas Examiner."

The Mantle Combination Phantom.

There appears to be a great deal of imagination expended on the question of a combine among mantle manufacturers, with the result that reports of a movement of the kind occasionally get afloat. But there they end; and we never seem to get any nearer the real thing. As a matter of fact, we do not want to. Our usually safe and sedate contemporary the "Journal für Gasbeleuchtung" is the last to commence the circulation of news as to a combination which has the arrogance to suppose that, from Berlin, they will be able to control the markets of Germany, Austro-Hungary, Sweden, Holland, and Switzerland. If there is any solid truth in the matter (which we very much doubt), there is something particularly amusing about such an assumption of power. The only thing that gives the report colour is the statement that the capital of the combine is to be £50,000. Very considerately, they are not intending to embrace England in their field of operations. The mantle industry of this country will, of course, feel themselves under a great obligation to the combination for their condescension in leaving them alone. However, as has before been said in the "JOURNAL," we do not believe that in Germany or anywhere else it is possible now to get the mantle manufacturers all under one hat. From one of the largest factories in Germany we learn that (as they have not been approached in the matter of the new combination) they are convinced that the whole thing is a fabrication or canard, which has probably been set afoot by those who are well stocked with thorium obtained in the days of lower prices. The inference to be drawn from this is obvious; but, of course, the writer of the letter only supposes this to be the case, and does not definitely assert it. On the question of thorium, the price has lately been in the neighbourhood of 45s. per kilo., as against something like 28s. a year ago. The information published last week as to the proposal of the Brazilian Government to have a geological survey of the monazite sands will, there is no doubt, cause further delay in the settlement of a contract; and it is possible this may be made the excuse for a further rise in thorium. Meantime, there are mantle makers who are able to view the prospect with serenity; others are not so easy in mind.

Electrical Speculations and the Rates.

When drawing attention a fortnight ago to the suggestion that the Watford Urban District Council should sell their electricity works to the North Metropolitan Electric Supply Company, we remarked that it seemed almost too much to hope that any great heed would be paid to the lesson which the proposal conveyed. In this, however, it appears we were mistaken, for already the case has been quoted at Lichfield, where great opposition is being manifested to the desire of the City Council to apply for an Electric Lighting Provisional Order. This is yet another instance in which the risks attaching to the embarkation by the Local Authority in such a business would constitute a serious menace to the inhabitants, for the rates already amount to 8s. in the pound, and any substantial addition to them would be nothing short of a calamity. Whether the Council will be wise enough to profit by the experience of others, remains to be seen; but pressure is being brought to bear upon them to this end by ratepayers through the medium of the local Press. It is satisfactory, too, to notice that the Gas Company are making use of the same means to impress upon those whom it may concern the advantages of incandescent gas light over electricity. They publish figures to prove that, with gas at 3s. per 1000 cubic feet and electricity at 5d. per unit, the Welsbach system comes out at less than one-tenth the cost of electric light. The ratepayers may ask themselves whether the Council are likely to be able to supply electricity at under ½d. per unit, so as to enable it to compete in the matter of cost with what the Gas Company have to offer. The Lichfield City Council may not be fortunate enough to discover a company willing to relieve them of their undertaking if they should find the business of electricity suppliers an unremunerative one.

Waiting for Something to Turn Up at Watford.

As regards Watford, the only item of interest during the past week was a meeting, under the auspices of the local Trades and Labour Council, to protest against the proposed sale of the works. This gathering did not add greatly to the stock of information on the subject; but it included a collection to defray expenses. One gentleman, in supporting the protest, referred to the profit on their water undertakings made by both Dover and Watford; but he forgot to explain what this had to do with the ruinous condition of the latter's electric light finances. Very much more to the point was the statement of a gentleman who, on being accorded permission to speak, said that the receipts from electricity at Watford for the past year were £5844, of which £3532 was from public lighting; whereas if they had not introduced the electric light, the latter figure would have been about £1800. So that even the admitted deficit of £1584 on the past twelve months' working is not anything like the total loss to the ratepayers. He further estimated that the town would have been £10,000 better off now, if it had not been for the electric light. One of the members of the Council wrote saying he did not imagine that more than two or three of his colleagues really believed in the handing over of the undertaking; and the others "were waiting to see what would turn up." Perhaps the above figures will aid them in coming to a decision. They would if fairly considered.

Borrowing Powers at Manchester.

The proceedings at the Local Government Board inquiry which was held at Manchester last week, respecting an application by the Corporation for a Provisional Order to increase the borrowing powers in connection with their gas undertaking, should constitute a good answer to those who are so fond of predicting the early effacement of gas by the newer illuminant. The Manchester Corporation possess electricity works, on which an enormous amount of capital has been spent; but notwithstanding this, the older undertaking continues to show most gratifying progress. No more than five months ago, application was made for leave to borrow over £250,000 for improving and extending the manufacturing stations, and for new mains, meters, and stoves. This completed the amount they were entitled to borrow under their existing Acts; but though the works for which the money was required are not yet finished, the Corporation already find it necessary to take steps with regard to the future. Hence the present application for a Provisional Order to increase their borrowing powers to the extent of £1,000,000. It is estimated that the loans so far sanctioned will carry on the works until the beginning of 1905; while the additional amount named is expected to last until 1915, by which time the Engineer (Mr. J. G. Newbigging) calculates that the demand for gas will be not less than 35 million cubic feet per day. As up to the present time the greatest consumption during any 24 hours has been under 26½ millions, it will be seen what an enormous extension of the business is contemplated. The reasons for anticipating this increase, which are fully set out in the report of the inquiry, are of the very best kind,

Comparative Cost of Ordinary and Prepayment Supplies.

Some interesting comparisons of the amounts paid for gas by prepayment and ordinary consumers at Nelson are contained in a report recently submitted by the Engineer and Manager, Mr. A. J. Hope, to the Nelson Corporation Gas Committee. From this report, it will be seen that within the borough the ordinary consumers pay 2s. 9d. per 1000 cubic feet; while the automatic meters are arranged to supply 27 cubic feet for a penny. Taking a consumption of 9966 cubic feet of gas per annum (the average amount used by each prepayment consumer last year), and reckoning the extra cost of meter and collection, it is found that a prepayment meter consumer pays 7d. a year more than an ordinary one. The former class of customers inside the borough have thus no cause to complain that they are being overcharged. The calculation as regards the outside consumers, however, shows an even better result; for with ordinary supplies charged at 3s. per 1000 cubic feet, and the automatic meters set to give 24 cubic feet for a penny, the amount paid (after making deductions for the extra cost of prepayment meters and collection) is proved to be the same in both cases. But in this connection it must be pointed out that the prepayment meter rent is taken at 10 per cent. on the cost in the case of outside consumers, and only 5 per cent. for those within the borough.

A Desirable Precaution.

The terrible double fatality at the gas-works of the Mountain Ash Urban District Council, which we unfortunately have to record, must cause those connected with the industry to reflect upon the desirability of men engaged in similar occupations having a supply of oxygen at hand for use in cases of emergency. There is, of course, no certainty at all that the lives of Mr. Rawlings and the stoker who so bravely went to his assistance could, under any circumstances, have been saved; but nevertheless it is sad to learn that, despite all his efforts, the doctor was unable to secure any oxygen to administer to the victims until the following day. The fact that the mishap occurred on Sunday may have had something to do with this, but, if so, that only emphasizes still further the desirability of keeping a supply within easy reach of those occupied on gas-works. Such accidents as that referred to are happily rare; but when they do occur, the need for the best possible restorative is most urgent. Prevention, no doubt, is better than cure; but there must always be a chance (however small) against which human foresight is powerless. It is just this chance which it would be well to provide against. It is not our intention to impute the slightest blame to the authorities at Mountain Ash in regard to the recent lamentable mishap, but merely to draw attention to a lesson which it seems to convey.

The Qualification of Councillors.

Some weeks ago, we were severely taken to task by the Clerk to the Rickmansworth Urban District Council (in a letter which was inserted in our columns) for having ventured—when discussing the intended purchase of the local gas undertaking by that body—to repeat a statement made locally to the effect that two members of the Council did not personally pay rent, rates, or taxes. This reference, our correspondent characterized as "unworthy of the 'JOURNAL,'" though it is difficult to imagine why he should have considered it so. As was afterwards pointed out, it is our opinion that "the persons who may be responsible for increasing the liabilities of a community should be individually pecuniarily interested in the result." Assured though we have all along been of the soundness of the doctrine thus expressed, it is nevertheless gratifying to find that this view has at least one supporter in Rickmansworth itself; for "A Ratepayer," in the course of a communication addressed to one of the local papers, says: "Unfortunately, there are very few on the Council who pay heavy rates, or they would hesitate to involve us in these unnecessary and costly expenditures"—he had been referring, of course, among other things, to the sewage scheme and the forthcoming purchase of the gas-works. Whether or not it is a fact that much of the Council's proceedings is kept secret, we do not know; but, in any event, no exception can be taken to the writer's statement that "the Council and their advisers should bear in mind that they are not dealing with their own private money or property, but are elected to do certain public duties for the ratepayers."

WATER AFFAIRS.

The Metropolitan Water-Works Arbitration.

THE resumption of the proceedings in the arbitration under the Metropolis Water Act, 1902, on Tuesday, was attended with something of a surprise. It was expected that two important decisions would be given as the result of the adjournment of the inquiry from the previous Friday; but as two o'clock was announced as the time for holding the sitting, they were not looked for till the afternoon. Great was the astonishment, therefore, in certain quarters, to find that by about that hour the amount of the award in the case of the East London Water Company was being made known in London by one of the cheapest of what are generally called "the usual channels of information." As to whether the special information furnished in this instance was turned to advantage in Capel Court we need not stop to speculate. The Company originally claimed £7,248,112 as compensation; and the Arbitrators have awarded them £3,900,000, assuming the undertaking to be liable for the payments into the Chamberlain of London's sinking fund, or £4,300,000 on the supposition that it is not subject thereto. The decision of this point will be left to the Court of Appeal, for which tribunal a case has been stated. The sums named are, of course, exclusive of the amounts to be paid by the Water Board in respect of the debts, debenture stock, rent charges, or other annual liabilities, as well as the taxed costs as between solicitor and client. Though, early in the inquiry, the Arbitrators expressed their intention of basing their award on an average of years, rather than on the accounts for the year 1902, the figures in which had been taken for the calculations presented to them, it may be pointed out that the lower of the two amounts is about 32 years' purchase of the net profits for that year, as given in Messrs. Wood, Drew, and Co.'s latest "Analysis," and is rather more than half what the Company asked; while the higher one is about 35 years' purchase. It is not a little curious that, in the "National Review" for December last year, Mr. F. Harcourt Kitchin estimated that a purchase price for the East London Company's ordinary stock, based on the average market prices for the previous five years, was £3,647,587. In calculating the true value, he ascertained the net earning power of the Company, after allowing for the interest expended on the capital sunk in unproductive storage works, and without deducting for payments into the Chamberlain's fund. Thirty years' purchase on the latter basis gave the value as £4,524,030, compared with the Arbitrators' £4,300,000. Publication of the award was followed by a rise of 7½ in the Company's ordinary stock, and another advance of 2 on Wednesday.

The terms obtained by the Company cannot, we think, be regarded as unsatisfactory, more especially in view of the attitude assumed by the Water Board in regard to the claim submitted. An "old iron" price was considered too good for the Company's works; while their sources of supply were roundly condemned. A great deal of evidence was brought forward to support the Board's advisers in the position they had taken up on this matter; but the Arbitrators were able to place in the balance against all this evidence the testimony of two such eminent men as Sir William Crookes and Professor Dewar, and the conclusions arrived at by the Balfour and Llandaff Commissions. That they gave due weight to that testimony and to those conclusions is manifest from the remarks made by Sir Edward Fry by way of introduction to the announcement of the award. They were applicable not only to the Company specially concerned, but to the others whose cases had been under consideration; and their effect was not only to restore but strengthen public confidence in the suitability of the Thames and Lea as sources of supply, which the newly constituted Water Authority, through their representatives before the Court, had done their best to shake. Reporting ten years ago, Lord Balfour's Commission expressed the opinion that "the water supplied to the consumer in "London"—and this was the chief point for the Arbitrators to consider—"is of a very high standard of excellence and "purity, and is suitable in quality for all household pur-"poses." Exactly four years ago, Lord Llandaff and his colleagues accepted the findings of the earlier Commission. The result of the present inquiry, so far as it has gone, has been that, notwithstanding the evidence given by such expert bacteriologists as are Dr. Klein and Dr. M'Fadyen,

Sir E. Fry has declared that no bacteria noxious to human life or health have been discovered in any of the waters supplied by the Companies, and no instance of disease has been traced to them. The Arbitrators were consequently bound to hold that the water of our two chief rivers must be taken, for the purposes of their award, as "capable of being supplied in good condition for domestic purposes." After this declaration, we shall probably hear less exaggerated talk about Londoners being poisoned with liquid sewage.

The other decision given by the Court on Tuesday had reference to the question of the liability of the Grand Junction Company to make payments into the Chamberlain's fund in respect of their association with the New River and West Middlesex Companies in the Staines reservoirs scheme. Under the Staines Reservoirs Act, 1896, the three Companies are required to make these payments at the end of the half year in which water is "first obtained" by means of the works authorized. The question the Court had had under consideration was the meaning of the words quoted. On the part of the Water Board, it had been contended that they meant "first obtained by the Staines "Reservoirs Joint Committee;" whereas the Companies urged that they referred to the first taking of water by them separately for purposes of supply. According to the former reading, each Company would have to pay when the obtaining of the water first took place; but assuming the latter to have been the intention of the Legislature, they would not pay until they had actually been furnished from the works with a supply for distribution, and consequently for the production of rental. The conclusion arrived at was that the first view was the correct one, and that the expenses and payments into the sinking fund all arose "when the joint "enterprise was entered upon;" and the Court would make a declaration to this effect. The President added that, so far as they were at present advised, the Arbitrators thought the Companies would have taken water at or about the same date; and therefore, to their minds, their decision was not one of very great importance. As a matter of fact, though the reservoirs have been filled, for testing purposes, with water drawn from the Thames at the expense of the Contractors, none has yet, so far as we are aware, been utilized for supply. Indeed, the auxiliary works to permit of this being done have not all been completed.

After these decisions had been given, the case of the West Middlesex Water-Works Company was opened by Mr. Cripps, K.C. The Company claimed the annual dividend of £115,506 paid on their ordinary stock capitalized on the basis of an equivalent investment—namely, the sum of £4,200,240; and, in addition, allowances for recoupment of loss of interest pending reinvestment, and a sufficient sum to cover costs, charges, and expenses. The Board's offer was £1,500,000. The case occupied the Court on Thursday, Saturday, and Monday. Before its resumption yesterday, however, Sir Edward Fry announced the award in the case of the Grand Junction Company. Their claim was for £4,863,195; and the Water Board's offer was £1,500,000. He said that if the Court of Appeal should hold that the Arbitrators were right in their decision on the point of law which had been raised with regard to the sinking fund, then the amount to be paid was £3,349,500. If, on the other hand, it should be held that they were wrong, then the sum would be £3,552,500. He added that the form of award they proposed to give as a special case, stating the point of law, would follow the form adopted in the East London Company's case. The subject of the valuation of the Clerkenwell and excepted properties of the New River Company was then referred to; after which the West Middlesex case was concluded, and the award made—the Company being granted £3,524,000, in addition to the costs. The Court then adjourned till the 18th prox.

Rainfall and Storage.

THE first paper read at the recent meeting of the British Association of Water-Works Engineers was by Professor Henry Robinson, and was entitled "The Storage of Flood "Water;" but its main value is found in the extraordinary and authentic statistics which he was able to furnish as to the rainfall of the present year. On the general question, the conservation of flood waters by their impounding, for use when the natural replenishing of the ordinary sources of water supply fails, has become an accepted doctrine of the highest water-engineering authorities; and, in the discussion at the meeting, there was only one member who dissented from it, and his views fell on unsympathetic ears. In the Staines reservoirs, we have the last unconfutable voucher as to the wisdom of preserving flood waters for the large populations of this country; and those reservoirs do not by any means represent finality in this direction. In the paper and in the discussion, it is seen that—though they are not mentioned by name—the view prevails that these reservoirs are only the beginning and not the end of a new order of things in respect of water supply; and what has been done jointly by London Water Companies in this respect will be an exemplar to many authorities responsible for the adequate provision of water in their districts in other parts of the kingdom. The necessity of impounding has obtained a strong hold upon those who advise in these matters, and nothing will restrain such work now, unless—and that would be a pity—it be a succession of very rainy years.

The present wet year coming before the recollections of the shortness of water for domestic purposes in London and elsewhere have been stamped out has impressed water authorities—engineering and scientific—with the dire waste that has hitherto been permitted in such years as this. True, subterranean sources have benefited; but the subsequent availability of this benefit to the community has fallen far short of any corresponding measure. Travellers in the Eastern Counties, for example, have seen hundreds of thousands of acres of land under water several times this year. Where has the water gone to? Will the inhabitants of these counties benefit in their future water supply to anything like, under other conditions, the possible realizable extent from the water that has fallen and been seen on the surface? A dry year, and we shall soon be hearing again of the water impoverishment of Essex, notwithstanding that, as Mr. C. E. Jones tells us, there has only been a fraction short of 3 feet of rain in the county during this year. And that figure is in agreement with the figures from other districts in and near the Metropolis, as produced in the paper and the discussion. The tables in the former are of remarkable interest; and it will be useful if Professor Robinson will obtain and make public those for the last two months of the year, so as to complete it. In the ten months to the end of October, there had been 151 rainy days; and the fall, according to the records at Greenwich Observatory, had been 32·34 inches, which was an upward departure by 11·85 inches from the average of fifty years. The total so far this year, by the records, has only been exceeded by 1872. It requires but a dry year or two on the top of this wet one to give a big impetus to the work of impounding the superabundance of years such as this for subsequent service.

One other main subject arose in connection with the paper, and that was the old one as to the need for legislation dealing generally with the water supply of the country, and placing it under the control of a specially qualified Government Department. A little consolation, after long-deferred hope, is found in the recommendations of the Commission on Sewage Disposal (which was a subject dealt with by Mr. Percy Griffith) in regard to the questions of centralization and the formation of Rivers Boards; and it is a cherished desire that the Government will soon take action on those recommendations. But expectations of speedy action must not be built too firmly on the success so far achieved. In such matters as this—though it is of national importance—the Government (not only the present, but it has been so with former ones) have a galling way of procrastinating; and just now they have their hands fairly full of questions which, in their wisdom, they may consider to be of superior moment. However, a move has been made; and the best thing that those who have shown an interest in the matter can do is to keep it well on the surface. That was the method which found success in the creation of the Metropolitan Water Board.

Increase in the Salary of the Nottingham Gas Engineer.—We are pleased to learn that the Nottingham City Council have shown their appreciation of the value of the services rendered by Mr. J. H. Brown, the Gas Engineer, by sanctioning a substantial addition to his salary. The matter came before them on a recommendation by the Gas Committee that there should be an immediate increase from £750 to £1000 per annum; and the proposal was agreed to. We heartily congratulate Mr. Brown upon receiving this testimony to the satisfaction of the Council at the manner in which his duties are being discharged.

ESSAYS AND REVIEWS.

WHAT IS DEBENTURE STOCK?

In a letter, dated the 10th inst., which appeared in the Money Article of "The Times" last Wednesday, Mr. H. D. Ellis, the Secretary of the Commercial Gas Company, called attention to a judgment delivered on the previous day by the Master of the Rolls, which has an important bearing on the question of the issue of debenture stock. The case was an appeal from a judgment of Mr. Justice Ridley on a special case stated by consent in an action brought by the Attorney-General, as informant, against the Regent's Canal and Dock Company, claiming duty and penalties under section 8 of the Finance Act, 1899. The defendants had at various times issued debenture stock to the amount of £411,852—viz, £110,000 of 3 per cent., £101,852 of 4 per cent., and £200,000 of 4½ per cent. By the Company's Act of 1900, the three stocks were extinguished, and in lieu thereof there was created a new 3 per cent. debenture stock. The holders of the original 3 per cent. stock received the same nominal amount of the new stock as they previously held of the original stock, while the holders of the 4 and 4½ per cent. stocks received new stock to such nominal amount as, at the rate of 3 per cent., would yield to the holder the same amount as was payable in respect of the stock previously held. The amount of new debenture stock which was required to carry out the provisions of the Act of 1900 was £529,136, and debenture stock to this amount was inscribed in the names of the persons entitled thereto, and certificates were issued in exchange for the old ones. Section 8 of the Act under which the Crown claimed duty and penalties, sets forth that where any local authority, corporation, company, or body of persons formed or established in the United Kingdom, propose to issue any loan capital, they shall, before its issue, deliver to the Commissioners of Inland Revenue a statement of the amount proposed to be secured. Subject to the provisions of the section, every such statement is to be charged with an *ad valorem* stamp duty of 2s. 6d. for every £100, and any fraction of £100 over any multiple of £100, of the amount proposed to be secured by the issue; and the amount of the duty is to be a debt to the Crown. By sub-section 5 of the Act, "loan capital" means (*inter alia*) any debenture stock.

The questions submitted for the opinion of the Court were: (1) Whether the defendants had, under the Act, proposed to issue, or had issued, any loan capital; and, if so, to what amount. (2) Whether a statement of the whole or any part of the new debenture stock was deliverable by the defendants to the Commissioners of Inland Revenue under section 8 of the Finance Act, 1899; and, if so, of what amount. (3) Whether the defendants were liable to pay to His Majesty the sum claimed, or any and what part thereof. Mr. Justice Ridley gave judgment for the defendants; holding that they had not proposed to issue any loan capital within the meaning of the section, and that the stamp duty imposed by the section was not payable. The Crown appealed; and the appeal was allowed. In the course of his judgment, the Master of the Rolls said the result of the operation performed by the Company was that one debenture stock was substituted for three classes, one uniform rate of interest for three rates, and a larger indebtedness for the old indebtedness. It was clear, he added, that the debenture stock was loan capital, and that the holders now possessed it as new stock.

These remarks called forth Mr. Ellis's letter, as he said they suggested serious reflections. He pointed out that the annual charge upon the undertaking in respect of interest upon the substituted debenture stock remains the same as that upon the original debenture stock. The increased indebtedness which was in his Lordship's mind was therefore an indebtedness in respect of capital, and it would seem that in his Lordship's opinion the variation, by a stroke of the pen, of nominal borrowed capital of £100,000 of 4½ per cent. debenture stock to £150,000 of 3 per cent. debenture stock would commit an undertaking to paying at some future date to the debenture stockholders £50,000 of money which the undertaking had never received and the stockholders had never lent. This view, he said, raised a question of tremendous importance to a multitude of undertakings—railway, dock, gas, and other companies—who had converted their debenture stocks, viz., What is debenture stock? He went on to show that the question had been fully considered and dealt with in the case of *Attree v. Hawe* on appeal before a very strong Court composed of Sir George Jessel (the then Master of the Rolls) and Lords Justices James, Baggallay, and Bramwell; and he gave the following extract from the judgment of the Court delivered by Lord Justice James:—

> It seems to be called debenture stock, *lucus a non lucendo*, because it is anything but a debenture. There is no debt, except, indeed, as to the annual interest; the capital cannot be called in, and cannot be paid off. It is a right to a perpetual annuity payable out of the concern. There is no conveyance or assignment of anything to the stockholder or to any trustee for him. There is an entry in the books of the concern that there is so much debenture stock on which there is so much to be paid half yearly to the holders, just like the entry of the National Debt in the great books of the Bank of England.

Having quoted sections 22, 23, and 24 of the Debenture Stock Act (Companies Clauses Act, 1863), his Lordship proceeded as follows:—

> There is nothing to give to the stockholders any right, either at law or in equity, under any circumstances, to take possession of a single item of the property of the company in specie, whether real or chattel. . . . The only thing really chargeable is the net earnings of the company—the same fund out of which, if sufficient, the dividends and interest of the other stockholders are to be paid. . . . The result is that the debenture stock is a charge on the net profits or earnings of a trading corporation.

This judgment appears to have held good ever since its delivery, as constituting the definition of debenture stock; but, as Mr. Ellis points out, the view expressed by the Master of the Rolls last week seems to be in conflict with it.

ELECTRIC LIGHTING MEMORANDA.

Another Council Meeting in Marylebone—A Preliminary Payment—The Case of Watford—The Sandringham House Fire and Electric Wiring.

The latest development of the Marylebone electric lighting muddle occurred last Thursday, when a special meeting of the Borough Council was held to consider the judgment of Mr. Justice Buckley on their recent application for an extension of time for completing the purchase of the undertaking of the Metropolitan Electric Supply Company, which eventuated in an order to pay the Company £60,000 by the 31st prox. Upon the pronouncement of this judgment, the unhappy Council forthwith took further advice in two quarters. The first thought was of an appeal from the order of the Court; but this was dismissed as quite hopeless—the judgment being really an indulgence. Next, the Council went to their bankers, who proved to be willing to advance the money requisite to satisfy the judgment; thus obviating the necessity of an immediate levy on the ratepayers. As might be expected, the Council meeting was marked by the profoundest melancholy. The Mayor opened the business with a plain statement of the deplorable facts, which did not attempt to show the existence of any extenuating circumstances in the situation of the ratepayers, condemned to find £60,000 for nothing of any value to them. All he could do was to express the hope that, at this crisis of their corporate history, the ratepayers would pull themselves together, and act single-mindedly for the good of the borough as a whole. Well might the meeting be lugubrious; for it was the prelude to the funeral of municipal trading.

The Chairman of the Finance Committee of the Council then brought up a report on the judgment, which merely advised that the money required should be borrowed on current account from the bankers, pending the promotion of the Council's Bill. Thereupon the flood-gates of debate were opened, and some voices were raised against the proposal, on the score that it would only be a postponement of the day of reckoning. Still, the practical consideration that it would be impossible to collect the money by special rate in time prevailed, and the Council agreed to the recommendation made by the Committee. This did not finish the business before the meeting. Mr. Edward White moved that the Council introduce a Bill next session to relieve the borough from the obligation to purchase the electric light undertaking, on the ground that it would be a heavy burden on the ratepayers. The motion was seconded; but the discussion had to be adjourned till the next meeting, early in February—the only business actually done being the sanctioning of the necessary steps to obtain from the Council's bankers the overdraft of £60,000 to satisfy the judgment of Mr. Justice Buckley. It transpired during the proceedings that the law costs already incurred in regard to this affair amount to about £35,000. Well might the Judge remark that the whole transaction was a satire on municipal trading. Meanwhile, a preliminary interview has taken place between the representatives of the Council and the Company, with a view to ascertaining whether, and on what terms, the latter are willing to let the Council off their rash bargain. It is only fair to Mr. Ernest R. Debenham, the Chairman of the Electric Supply Committee, to note that he has made out a plausible case for the transfer, which at least justifies the valuation of the property.

The case of Watford, following Willesden in the course of disposing of the local electric light undertaking to the North Middlesex Electric Supply Company, has terribly discomposed the journalistic advocates of municipal trading, who are nothing if not the friends of all enterprise of this kind—at the expense of others. It does not appear that the newspaper gentlemen who display such admiration of municipal trading are themselves ratepayers in the places which they profess to instruct in this regard. This is not, perhaps, a very serious consideration; but one would naturally think that the circumstance might make them at least civil towards those who do feel the pinch of municipal electric lighting losses. Not a bit of it. We have before us a perfectly rabid article on the Watford proposal, which is politely called a "Cowardly Scheme." Yet the facts which have to be admitted even by this ridiculous writer are serious enough to give the ratepayers plenty to think about. They are committed to a capital burden of about £58,000, and the undertaking

has been at work for four years, during which the annual loss has averaged about £1500; and it is still losing, though the rates are heavily charged for public lighting. Besides, it cannot be denied that for some time past the quality of the service has been very unsatisfactory. This defectiveness was ascribed officially to inadequacy of plant; and a few months ago the Electrical Engineer got out an estimate of what he thought was required, and it amounted to upwards of £25,000. Naturally, the District Council were frightened at this additional demand, and concluded that it would be cheaper in the end to cut the loss and get rid of the obligation. This decision makes the "Municipal Journal" foam at the mouth. But it will take a good deal more than the perfunctory abuse of an outside journalist to put a better face upon the Watford installation, The ratepayers are to be congratulated upon the discovery of a possible purchaser of their unfortunate venture, which is clearly not everybody's money. Many others will envy them the chance of getting it off their hands.

Our contemporary the "Electrician" commenting upon the recent outbreak of fire at Sandringham House, while Her Majesty the Queen was in residence, very properly notices the reports that were circulated with the first news of the occurrence, to the effect that the fire was due to the fusion of the electric light wires. Later information discredited this statement as to the cause of the fire, which is now officially recorded as attributable to something else. We have never committed the *bêtise* of making capital out of the fire troubles of electricians; for the reason that all sensible people are fully aware that a certain amount of additional risk is inseparable from the use of the appliances of the most advanced civilization. At the same time, it does not do to grant unreservedly to our friends the electricians all they are sometimes disposed to claim in respect of the alleged harmlessness of all their fittings and appliances. In the present connection, therefore, while allowing the "Electrician" to be quite justified in nailing to the counter the false accusation in question, we cannot unreservedly accept the conclusion with which it finishes its notice—that "users of the electric light may still rest assured that this method of artificial illumination is undoubtedly the safest of any." Tell that in Birkenhead! Doubtless, where wiring work is properly done, both as regards material and workmanship (a large condition), it is possible to use the electric light indoors with a high degree of security; but this meed of protection costs money, which is the one thing that everybody desires to spare in these jobs—they being costly in all circumstances. Besides, certain correspondence in the "Ironmonger" sheds a lurid light on the way in which wiring work is often done. It appears that the traditional "three-branch hand" has found it to his profit to develop a fourth branch, that of "electrician.' He finds no difficulty about it; and he declares that anybody possessing the aptitudes of a plumber can pick up a sufficient knowledge of the work as he goes along. Possibly; but the prospect of a wire man learning his trade at the expense of a householder would be discomposing to the latter, if he knew it. The converted plumber might possibly claim his first fire, like the dog his first bite.

THE GAS AND WATER STOCK MARKET.

Business on the Stock Exchange last week was extremely quiet. With the Christmas holiday close in front of them, operators were very chary of committing themselves far; and the cautious public thought it best to stand aloof altogether. The opening was favourable and promising; but a rude shock was sustained when the fact transpired that Russia's reply to Japan was not satisfactory. This caused a more or less general depression all round, and prices almost without exception suffered. The close was quite flat; and yet, as we noted last week, there was a sort of feeling that war will be avoided, though the feeling was not strong enough to back. In the Money Market, things were quite easy in the earlier portion of the week; but they stiffened considerably later on, and rates were well up at the close. According to the usual course of events, tightness should rule up to the end of the year. Business in the Gas Market at any rate did not seem to suffer from the general blight, for it was a good deal more brisk than the week before. And, moreover, the market was extremely steady; only one quotation in the London list being altered, and that for the better. The weather last week was more congenial from a gas-selling point of view; and if we get an "old-fashioned" Christmas, the business will proceed merrily. In Gaslight and Coke issues, the ordinary was quite active almost every day, and the price never wavered—every transaction being within the limits of 88-89. There was not much activity in the secured issues, and prices were not remarkable. South Metropolitan, too, was pretty active; but the price was frequently no better than 116. In Commercials, there were a few dealings at improved figures. In the Suburban and Provincial group, business was slack as usual, and the few prices recorded gave no indication of any marked tendency. On the local Exchanges, Liverpool "A" advanced a point; but Newcastle and Sheffield "C," which were standing very high, underwent a slight reduction. Among the Continental Companies, European was conspicuously active and firm; and the fully-paid shares advanced. There was no movement in the more remote undertakings. In Water, there was great animation, coupled with a more cheerful feeling. The Arbitrators' award of £3,900,000 to the East London Company (or £4,300,000 if immune from liability to the City Chamberlain's fund) relieved the disagreeable tension, and induced a better feeling. Some fair recoveries in the quoted figures were effected; but New River was an exception, and had a further fall.

The daily movements were: On Monday, European fully paid rose ½. In Water, New River fell 5. On Tuesday, New River fell 5 more; but East London rose 7½, and Southwark 5. On Wednesday, West Middlesex advanced 5, and East Lon don 2.

STREET LIGHTING BY INCANDESCENT MANTLES.

Some Points on Photometer Work.

It would be of public service if some individual with the time and appliances at command would make a test of the relative values of the light emitted from a mantle at different angles.

A correspondent writing on the subject says that very little consideration will make it plain that the readings of horizontal rays taken in the laboratory are no guide to the verdict that will be pronounced upon the same light in the street, as this will be materially discounted by the losses from atmospheric absorption, by reason of the comparatively long distance between the light and the instrument. But, more serious still, the angle at which the reading is taken considerably affects the result. This arises from the fact that the value of the light, horizontally projected from a mantle, is due considerably to the front radiations being reinforced (through the apertures in the reticulations of the fabric) by the light emitted from the back portion of the mantle, and the partial cutting off of this source of supply becomes a serious loss. This cutting off does not obtain with horizontal readings; but, obviously, the greater that the angle of observation approximates towards the perpendicular, the more the opaque surface of the burner head intervenes, and cuts off the reinforcing effect of the back portion of the mantle, as above referred to.

Now the greater the elevation of the lamp-post, the greater must be the loss, either from the unavoidable sharpness of the angle of observation, as just explained, or, secondly, from the increased length of atmosphere through which the beam must travel if the observing instrument be carried far enough away to produce any material flatness of angle. The same light, tested on different posts, one (say) of twice the height of the other, even if the same angle of observation be followed, would show different values, unless the atmosphere was of perfect purity—an impossibility in any large city, and, in a London winter, hopeless.

A ready means of ascertaining how large is the reinforcing effect of the back portion of the mantle is to place two ignited mantles in line (one behind the other), and observe them through a sheet of blue glass; then remove the hindermost mantle, and notice how much more transparent or skeleton-like the first mantle appears to become. We cannot, of course, remove conveniently the back portion of a single mantle; but the loss would become relatively greater. In a so-called "blinding" snow-storm, the flakes in a few yards of atmosphere completely obscure any object beyond; but in the same storm in a slice of atmosphere (if one may use the term) a foot thick, there would still be spaces through which an obstacle could be discerned. Thus mantles, or portions of mantles, in a line tend to reinforce each other, though obviously not giving the same value as a reading taken at right-angles to the line of lights. It is well known that the focal plane of a mantle is well down toward the burner-head. Therefore the loss in vertically angular observations is very much greater than if the light was evenly distributed throughout the mantle length.

A consideration of these points will perhaps explain the difficulties under which contractors labour when under bond to maintain a given light, and judgment is pronounced *from the tests made at an angle on the ground-level.* The arc light, as well known, has a maximum light at 45°, and so the same observations are not applicable. The reason, however, is plain why the mantle light carries so much further than the ordinary arc, as in the first case the flatter the angle (long-distance effect), the better the beam; but in the latter case, the flatter the angle, the worse the beam.

Mr. John Devine, Manager of the Auchinleck Gas Company, died on Monday last week, at the age of 64.

Messrs. Willey and Co.—The business at present carried on by Mr. H. A. Willey, under the style of Willey and Co., Lighting Engineers, of Exeter, will be forthwith registered as a private Limited Company, under the Joint-Stock Companies Act. The new Company commence operations on Jan. 1. The conversion of the business is for family and other reasons; and it will be conducted under the same management as heretofore—Mr. H. A. Willey being the Chairman and Managing-Director. The other Directors are Mr. S. J. H. Willey, Mr. Stephen Simpson, Mr. George Weslake, and Mr. F. T. Depree, J.P. Mr. T. Glanfield has been appointed Secretary. Many important developments of the business have been made in recent years; the new Company having branches and depôts in London, Plymouth, Devonport, Swansea, Newport (Mon.), Barnstaple, Cape Town, and Auckland (New Zealand).

HOW TO GET DESPATCH IN CONSTRUCTION.

PROBABLY nothing in the whole range of engineering and building construction work in recent times has more moved and interested British engineers and contractors than the bold advertisement given to what were described as the American methods of expediting the building of the Westinghouse Works at Manchester. Coinciding, moreover, with the disclosures as to the systematic spoiling of the British workman by the London County Council, under Trade Union dictation, these statements of the rapidity with which American masters, even in England, could get bricks laid and buildings covered had the greater effect. The attention of the public, and of those who get their information concerning such matters from the newspapers, was arrested by the remarkable difference asserted to exist between the number of bricks which the workmen employed by the Works Department of the London County Council consented to lay for their daily wage, and the tale of bricks which the Westinghouse Company were getting laid in Manchester. Though, as usual, precise information on the point was refused by the County Council, the facts could not be hidden. Engineers, however, who know rather more about these matters than most other people, did not limit their curiosity in regard to this question to the mere laying of bricks. They knew that illustrative particulars such as this can be wholly misleading, while literally true; and they wanted to know the whole truth. It is, therefore, news deserving of the widest publicity, among all followers of the structural engineering and building trades, that a full statement of the whole business in question has been made by Mr. Charles Heathcote, of the well-known Manchester firm of architects, before the Institute of Builders. It is not our intention to give in any detail either Mr. Heathcote's paper or the discussion upon it. Those who are engaged in building work should procure the text and study it. All we can do here is to bring out the salient facts and propositions which elucidate the question of how to secure economy and despatch in construction, which is certainly not one of those aptitudes that come by nature.

This is an affair which is divisible under several heads. We all know, for instance, that there is such a thing as extravagance of design; but this is not the present point. It will be assumed, for the immediate purpose, that the engineer or architect has done his part properly, and that the question is that of getting the work done to the best advantage as to time and cost. It is merely incidental to this general inquiry, to know how much straightforward work can be expected from the various descriptions of labour employed. It was reported that on some of the Westinghouse buildings 1600 bricks were laid per man per day. Mr. Heathcote, who was associated architect for the job with Mr. Rodd, the American engineer, confirms this statement. He also said he had had the same number of bricks laid in a two-brick wall in a very different kind of building—Parr's Bank, Manchester—in ordinary bond set by trowel in firm mortar made with Warmsworth Cliff lime. This was without paying extra wages, either. But 1600 bricks per man was not the average; and the author knows of no building in which it was the average. Circumstances alter the rate of work; but it is Mr. Heathcote's judgment that in an ordinary building, faced with stocks, with stone dressings, general internal walls with the usual doorways, arches, fireplaces, flues, beam filling, and so on, if a bricklayer averages throughout 700 English bricks of common brickwork per day of ten hours, he is doing a fair day's work for 8s. 4d."

In connection with this matter, Mr. Heathcote has been at some trouble to obtain data of English bricklaying under English superintendence. The following records are vouched for: Great Northern Railway extension works, Manchester—foundations, 3 feet thick, in hydraulic lime mortar, English bond, average 1760 bricks per man in nine hours. Same job; stanchion foundations, blue bricks in cement, 1056 bricks per man in nine hours. In a 3 feet wall, both faces finished with picked blue bricks in cement, 704 bricks per man in nine hours. Walls 18 inches thick, common brick in hydraulic lime mortar, English bond, wall faced one side in picked bricks, 846 bricks per man in nine hours. On a job in Bolton, 18-inch wall, faced with selected bricks pointed up, 882 bricks per man in nine hours. Same job, an abutment 8 feet thick, faced one side with white glazed bricks in putty mortar, 909 bricks per man in nine hours. All this was done by men on ordinary wages of 10d. per hour under Trade Union rules, without bonuses. Another example cited was that of a refrigerating store near the Market, Manchester—a building of nine floors, with basement and sub-basement, finished with terra-cotta bonds, mouldings, and cornices. This job averaged 750 bricks per man per day of ten hours, from first to last, on ordinary wages.

The foregoing particulars relating to the laying of bricks should be sufficient for a standard of reasonable performance on the part of the bricklayers. As regards the getting of a complete job done in the best style, there are other considerations to think of. It is possible to learn something from the Westinghouse job, though the conditions were not those of a single job, let to one builder. No contractor was asked to undertake the whole work. All heavy work was let separately at per ton, per cube foot, or per square yard. The whole secret of success lies in the one word—preparation. On one side of the site were brick-kilns; and while the excavations were in progress, some 4,000,000 bricks were made and stored, the site was levelled, and about eight miles of railway track laid down, connecting all parts of the works together, and proceeding from a main track from the docks and the principal railway lines. Timber was procured and stacked alongside the rails; the large machine-shop foundations were in; the steel work well advanced—in fact, preparatory work and materials to the value of £250,000 were in the job before the Company's construction agent arrived to engage bricklayers, carpenters, &c. His duty was to push on the work as rapidly as possible, thereby saving interest on the cost. Any number of men were put on, at extra wages for the best, which facilitated weeding out the inefficient. Every drawing was ready. There was no delay of five minutes for instructions or materials, which is what runs away with money.

The way to get work done quickly is to have heaps of materials ready, and put on every man for whom there is working room. The best men must then be picked out and adequately rewarded, by a 10 per cent. bonus, while plenty of foremen and superintendents see that the money is fairly earned. Much depends upon the kind of foremen; the best being worth any remuneration that will retain them. The true economist in works' construction is aware that it is not the rate of wages paid that determines the cheapness or dearness of the job, but the amount of work that is done. Another example of quick work, done by the Manchester firm of Robert Neill and Sons, was given by Mr. Heathcote to prove that, when occasion demands despatch, English firms have no need to go to school to Americans. Peak's warehouse, in Portland Street, Manchester, was gutted by fire on July 24, 1902, and had to be rebuilt and modernized. The clearing of the *débris* and insurance matters took until Sept. 7. On that date the contract for the new building was signed, and complete drawings and details were supplied. Meanwhile, a steel rolling-mill had been set to work, and also a foundry. The result of organizing and looking ahead, spending £500 additional on pushed labour, and having good men on the job from top to bottom, was to have the whole warehouse completed and business resumed by Jan. 24, 1903—twenty weeks from the signing of the contract. The cost was about £23,000. This was the result of trained organization and preparation.

A point of the utmost gravity was made by Mr. Heathcote when he gave it as his opinion that the levelling-down policy of British Trade Unions has the effect of driving the best workmen to emigrate. The same result is also produced by the fault of English employers in not perceiving the economy and efficiency of high wages. The consequence is that the most enterprising and ambitious of the younger men chafe under the restraint of the Union on the one hand, and are disheartened by the lack of encouragement from stupid employers on the other. The United States is careful not to be the dumping-ground of the world's refuse. It is content to see England enjoying this privilege. It wants the best class of immigrants, who have the hardihood to put their merit to the test in a wholly industrial commonwealth, where there is nothing to prevent the best men from getting to the top of the tree. Here, thanks to the Trade Unions, once a labourer, always a labourer. There, a man is counted a bricklayer if he can lay bricks. The conservatism of the ordinary English Trade Society is almost beyond belief, and is certainly not known to those arm-chair politicians who are led to pretend that Trade Unionism is a progressive institution. Mr. Heathcote reminds us that the first brickmaking machines were made in England; but the men working them were killed. Where is the hod-man of our youth? The first building in Manchester where hods were dispensed with was the Town Hall, built less than thirty years ago; and then the contractors had to obtain the protection of the police. The same tale can be repeated of every trade. Of all the drawbacks to Trade Unionism that could be recited, and they are neither few nor small, that of the restriction of output and the forced limitation of the numbers in a trade is the most pernicious to the men themselves, their trade, and the country. Almost everything else in the way of working-class particularism might be pardoned more easily than this, which is truly the unpardonable sin in industrialism. Unfortunately, it is also the commonest.

Mr. Heathcote's one prescription for lessening the difficulty with labour is "to pay the best man the best wage you can afford him, so long as he gives you his best; make him to realize that his best friend is his employer, and that it is his personal advantage to forward the employer's interests." This is all very well; but it covers a large order. Essentially, it is tantamount to throwing over the wages system altogether; for if this, in its modern form, has any logical basis, it is that of the equal desert of all the men of a trade. The Trade Unions are founded upon this principle. The only alternative possible is profit-sharing in some form; for, in business, the only merit is the economical one of being worth more money. If, therefore, the most profitable workman is to be paid according to his deserts, it can be on no other principle than a suitable acknowledgment of his share in contributing to the employer's prosperity. Needless to say, this is diametrically opposed to the principle of Trade Unionism, which sinks the employer in the capitalist, and stigmatizes the latter as all that is odious. Those who hold this view to be wrong and detrimental to the best interests of the community, including working men themselves, must be prepared to face the facts as well as bear the consequences.

Returning to the main purpose of this article, however, which is

that of showing how certain engineering and building constructions which hold the record for economical and speedy execution were carried out, it may be repeated (for the behoof especially of young engineers) that the key to success is adequate preparation, both in the office and on the ground. It is not a question of haste, which still occasionally means "less speed," but simply of everything being prepared beforehand of the executive expenses, so that there is no waiting. There is a great temptation for engineers to put off the settlement of details of construction to such time as they are supposed to be wanted by the contractor. For his part, the contractor is helpless in this matter. He cannot even know when he will be wanting these reserved instructions; but if, as usually happens, he has to wait for them until the work ought to be in hand, it inevitably means delay. Another point is that the designer, be he engineer or architect, should know perfectly well from the outset how the constructor is going to set about his work. Failing this knowledge, all manner of hindrances and incumbrances are apt to creep into the scheme. The provision of the necessary accommodation for the contractors' plant and materials is one of the considerations which may not appertain to the task of the designer; but he can only neglect them at the expense of the common employer.

MR. GLASGOW'S "POLICY OF GAS ENRICHMENT" PAPER.

In compliance with a request made to him, Dr. Alex. C. Humphreys has been good enough to forward for publication a digest of his reply to Mr. John West's criticism of Mr. Glasgow's paper, at the meeting of the American Gaslight Association. A short report was reproduced in our last issue from the "Progressive Age;" but we prefer that readers should have Dr. Humphreys' own version of his speech. The article which appeared last week (p. 671) giving the essential parts of Mr. West's criticism, but omitting all mention of matters foreign to the main question, did not, through the excisions, include references to naphthalene, the Dessau and Bunte experiments, &c.; and this is mentioned here in order that some of Dr. Humphreys' statements may not appear to be unfounded.

Answering the discussion (in the unfortunate absence of the author), Dr. Humphreys said, in regard to the unfairness of discussing English practice here, because such discussion might involve an attack on English engineers not present to defend themselves, that, if Mr. Doherty's view were accepted, it would result in hampering and limiting the work of their Technical Societies. In view of the personal nature of Mr. Doherty's and Mr. West's criticisms, he would say that Mr. Glasgow, before leaving England, wrote to Sir George Livesey, asking him to prepare a written discussion to be presented with the paper. Sir George Livesey, in most courteous terms, acknowledged Mr. Glasgow's evident desire for fair play, and said he did not care to take advantage of Mr. Glasgow's offer. Continuing, Dr. Humphreys remarked that Mr. West had attempted to discuss a question which he did not fully understand. He would advise Mr. West now not to be satisfied with simply reading the paper. Simply reading a paper of this character was not sufficient. That Mr. West had not studied the paper was evident, since a large part of his argument was based upon an incorrect reading of the paper, which led him to combat a statement of Sir George Livesey's by reason of his mistake as to its authorship. Sir George Livesey would be the last man to avoid responsibility for the statement as to the special photometers.

Taking up the question of the special tests, Dr. Humphreys continued: Mr. West said that Mr. Glasgow had come over here to try and deceive the members in regard to the South Metropolitan gas. Mr. Glasgow had done nothing of the kind; he had presented the conditions as they were acknowledged to exist in London. Mr. Glasgow stated that 16-candle gas was to be found at the official testing-stations, and that the parliamentary requirements had been met. The special tests were made to determine how the South Metropolitan gas carried the enrichment. The nominal 16-candle power gas and the nominal 14-candle power were used; and Sir George Livesey said that, while these were not complete tests, they were fair as comparisons. Mr. West had spoken disparagingly of Dr. Clowes. Within a few days, an eminent scientist of the English Educational Commission, then visiting America, had testified to Dr. Clowes' special ability in his particular line of work.

Again, Mr. West's arguments in regard to the two gases tested by Mr. Glasgow were based on misconceptions. The simple question asked by Mr. West, why Mr. Glasgow did not make the comparison between the enriched 16-candle power gas and the South Metropolitan Company's 14-candle power gas, was an admission that Mr. West did not understand why Mr. Glasgow made the investigation. Dr. Humphreys brought out that the South Metropolitan Company, acting under the authority of Parliament, supplied their consumers with a gas of reduced candle power at a reduced price. The proposition was then made to force the Gaslight and Coke Company to make a reduction of 2-candle power in their supply, and in this connection make a certain reduction in price to the consumers. It was for the Company to determine what would be the commercial result of such a reduction; and as in case of reduction in candle power, the water gas would still be used as an auxiliary, the comparison had to be made with 14-candle power mixed gas.

In regard to the Dessau and Bunte experiments, Dr. Humphreys could quite understand that Mr. West might fail to see the point. It seemed hardly worth while for Mr. West to express an opinion thereon, since he admitted having never seen the record of these experiments. Mr. Glasgow had seen and studied it, and showed that the conclusions drawn therefrom were worthless. Dr. Humphreys thought that, if Mr. West could show them how to make straight coal gas that would not deposit naphthalene, they could make it worth his while, and, further, that there would be a great future for Mr. West in America if he would show them how, by the employment of higher carbonizing heats, to distil, from a given quantity of coal, not only an increased volume of gas, but to give to the increased volume a higher calorific power.

In closing, Dr. Humphreys said it was not worth while to go into any calculations with Mr. West at the present time. If Mr. West would, on his return to England, study the paper carefully, and prepare a reply, Dr. Humphreys could promise him that it would receive careful attention and a careful reply, if there was any necessity therefor.

The following letter by Mr. James Somerville, of Indianapolis, commenting upon a communication on the subject by Mr. Frederic Egner (a copy of which was given on p. 681 last week), has appeared in the "American Gaslight Journal."

I expected someone to reply to Mr. Frederic Egner's extraordinary criticism on Mr. A. G. Glasgow's paper in your issue of Nov. 23. I see in your last issue he again returns to the subject. He charges Mr. Glasgow with advocating the enrichment of gas, and of selling a high candle power. As I read the paper, I cannot find the slightest intimation that he does anything of the kind. He does advocate, however, that in selling a low-grade gas the consumer should have such a reduction in price that would compensate him for the loss of energy in the gas, and shows, I think conclusively, that in one case the consumers of the South Metropolitan Gas Company have not received an equivalent reduction, but in fact have been defrauded. This is a serious charge; and it would be interesting to see it refuted.

As Mr. Glasgow well says, and I wish those advocates of low-grade or fuel gas would bear it in mind, "Gas *as gas* has no value to the consumers. Its whole value depends upon its ability to convey and develop useful energy, and that gas is cheapest which provides the maximum energy at the minimum price." Mr. Egner evidently thinks that a gas containing 500 heat units is just as valuable to the consumer as one containing 670.

PREMIUM PLAN OF PROFIT SHARING.

Until all element of gift is removed from the relation between workman and employer, and a fair business basis substituted, profit-sharing will be only a palliative, not a curative, measure for friction and dissatisfaction, in so far as shops of small or medium size are concerned. This is the dictum with which Mr. Kenneth Falconer concludes, in the current issue of "Cassier's Magazine," an article introducing a system of profit-sharing. The scheme he has to offer is based on the premium principle of paying wages; and he does not put it forward as one from which perfect results may be expected, but as one, coming from an unbiassed and totally disinterested spectator, which would appear to be based on fairness and equity. Upon the strength of this claim alone, the proposal deserves careful consideration at the hands of employers of labour. Even though the scheme as outlined may not be so suitable—if, indeed, it would be at all practicable—for gas-works as for engineering shops, &c., our readers (who are naturally deeply concerned with all proposals calculated to enhance the interest of workmen in the success of the undertaking by which they earn their bread) may at all events derive some hints from what the author has to say; and it is with the hope that this may turn out to be the case that we draw attention to the article.

Mr. Falconer is of opinion that of all modern systems of paying for productive labour, the premium plan stands pre-eminent for fairness of principle; the central idea being that the gain due to increased profit by a workman should be divided between the man and his employer. He therefore argues that the application of this principle to profit-sharing should result in a plan by which the profits realized on productive labour would be shared between master and man; and that a division of profits on such a basis that the producer would have a direct and proportionate interest in that part of the profit which was realized on his labour would appear to be more equitable than the setting aside of a certain arbitrary amount or percentage to be distributed among the employees. The whole point of the present proposal is that "supposing labour to be recognized as an equal partner with capital in the manufacture of a given article, that article contains only one element the profit on which should be shared—namely, the wage cost;" all other charges being entirely the concern of the master. The material of which the article made by a workman is composed is solely the property of the employer; and the indirect outlay incurred to manufacture it, the expenses of selling it, and the general administration charges of the business are also his affair alone. Therefore he is entitled to all the profits made upon expenditure in these various directions. As regards the wage

cost of the article, however, says Mr. Falconer, the employer furnishes the money and possibly the business ability necessary for its production, while the workman supplies the labour and skill; and it is only the profit realized as a result of the combination of these four factors that should be distributed between the workman and employer, if profit-sharing is to be adopted on a business basis instead of as a gift proposition.

The author includes in his communication four small tables, by means of which he makes clear how his idea would work out in practice. Three cases are given, in each of which the same conditions are assumed to exist, except as regards the wages cost; and it is shown by means of these examples that the profit earned by the workman would vary in direct proportion to his efficiency as evidenced by the length of time taken by him to manufacture a certain article. The proportion of profit that is realized on the selling price of the article having been ascertained, this percentage is applied to the item of wages; and the resultant sum is divided equally between the employer and employed. If with the wage item standing at (say) 16s., the selling profit on an article is 50 per cent., the profit on the wage item would be 8s., which would leave 4s. as the workman's share; while if the wages were halved (owing to his greater proficiency), the selling profit would be 80 per cent., and the workman's share of this proportion of the wages item would be 3s. 2½d.—or getting on for twice as much as in the former instance, considering the shorter time occupied.

It is admitted by Mr. Falconer that it is not probable that his system could be adapted to distribute the employees' share of profits among the individual workmen according to the labour expended by each; but it could be used as a basis of distribution of profits among all workmen employed directly on productive work. As he remarks, "bystanders see most of the game;" and certainly Mr. Falconer has made good use of his opportunities, as a spectator, for getting an insight into the relations subsisting between Capital and Labour.

DISPLACING ELECTRIC ARC LAMPS.

A Handsome Column.

Just recently attention was called to the fact that the large contracts for incandescent gas lighting entered into by the public authorities of London would prevent any considerable expansion of electric arc lighting in the immediate future; and we do not hesitate to acknowledge that it is not without some feeling of pleasure that we are in a position this week (through the kindness of a correspondent) to give a photographic view of the commencement of the displacement of electric arc lamps in the streets of London. Whether the conquest will go forward in this direction, it is preferable not to prophesy. But any way this is a fair start, and a success worth putting on record. The view is of Westbourne Terrace; and for the information of provincial readers unacquainted with the locality, it may be mentioned that it is in the district of the Gaslight and Coke Company. The view also shows that it is one of the aristocratic quarters of London; and this rather gives piquancy to our satisfaction. It was on Oct. 31, 1898, that fourteen arc lamps were fixed in Westbourne Terrace; so that they have only enjoyed the short life of five years; and their towering columns are to-day useless—to Westbourne Terrace. In their stead, there are now fixed forty one-burner (4¼ cubic feet an hour) incandescent gas-lamps and one three-burner lamp.

Westbourne Terrace—The Resurrection of the Fittest.

The second view is of School Hill, Lewes; and the noble looking and highly ornamental lamp which is seen there has also displaced an electric arc lamp. The Directors of the Lewes Gas Company and their Engineer (Mr. Levi Monk) rightly regarded the situation and the opportunity as very fine ones for doing something out of the ordinary; and the result is the column shown in the illustration. It bears four Welsbach 300-candle power self-intensifying gas-lamps—a central one, and three on arms. Altogether the lamp forms a graceful piece of work; and, in the lighting of this prominent position, it leaves nothing to be desired. Mr. Monk has been interesting himself in this question of special lamp columns for special positions; and he has found some handsome ones in London. He tells us that there is a similar pillar to the new one at Lewes fixed on a large granite base (very high up) at the top of Shaftesbury Avenue, opposite the Bloomsbury Baptist Chapel; but as trees were planted round it, and the lamps are old circular ones, with ordinary burners, it is spoilt, and the lighting effect is poor. He instances another handsome one in Holborn, at the foot of Gray's Inn Road; and at Charing Cross there are three, which cost £300 to £400 each. There is an elaborate one, too, at the bottom of Northumberland Avenue, which, with four small guard pillars, cost (so Mr. Monk has heard), something like £800. There may be several more of equal note to these examples. The column which has been erected at Lewes was supplied by the Coalbrookdale Company. The Gas Company and their Engineer must be complimented on having made the most of an excellent opportunity. Such work brings its reward.

A Case at Lewes: A Splendid Lamp Column.

The Law and Incandescent Gas Lighting.—To custom and precedent, the legal profession cling dearly. The startling information was published last week that at the close of this year the authorities of the Inner Temple are contemplating the substitution of the incandescent system for the present antiquated mode of lighting the staircases and thoroughfares of their Society. The suggestion is made that the Middle Temple might well adopt a similar plan, as the lighting of some of the staircases of their chambers is of the most primitive character.

Cost of Royal Commissions and Select Committees.—Last Tuesday a return was issued from the Treasury showing the annual cost to the country of Royal Commissions and Select Committees of Parliament appointed during the ten years ending with the last financial year. Some idea of the increased expenditure incurred for the first-named purpose may be formed from the fact that in 1893-4 it was £8699, whereas last year it was no less than £42,507. For Select Committees, the expenses range from £2945 up to £7826. The outlay in the ten years covered was: Royal Commissions, £232,808; Select Committees, £52,337—total, £285,145. During the period included in the return, £7264 was received by the Stationery Office for reports, &c., and £5564 for minutes of evidence—together, £12,828. Thus the net cost was £272,317.

The Air of the House of Commons.—In the opening of last year, a Select Committee was appointed, and subsequently reappointed with certain changes in its constitution, for the purpose of inquiring into the ventilation of the House of Commons. To assist them in their investigation, they instructed Mr. W. J. Atkinson Butterfield, M.A., F.I.C., to make a number of analyses of the air in the Debating Chamber and many other parts of the House. The object was, in the words of the Committee, "to determine, as exactly as present scientific methods will allow, the actual condition of the air in the chamber when in use." Mr. Butterfield's report, which was published in the "Journal of Hygiene" for October, has been reprinted in pamphlet form, and we have received a copy from him. The conclusion he arrived at was that the ventilation of the chamber, as shown by his determinations of carbonic acid, is exceptionally good, when judged by the standards which have received authoritative recognition.

PERSONAL.

Mr. G. MAYNE, the Manager of the Mickleover and Etwall Gas Company, Limited, has been appointed to a like position under the Mountain Ash Urban District Council.

Mr. JAMES HAMILTON, of Rothesay, has been appointed, out of 74 applicants, Gas Manager to the Kirkcudbright Corporation, in succession to Mr. D. Irvine.

Mr. J. C. STEWART, Manager of the Stonehouse Gas Company, Limited, has been appointed Manager of the Strathaven Gas Company, Limited. The post at Stonehouse has been filled up by the appointment of Mr. GAVIN MUIR, son of Mr. Robert Muir, of Galston. Mr. Muir has been trained in his father's works. He met a Committee of the Directors of the Stonehouse Company, and was unanimously offered the appointment.

In the paragraph in the "JOURNAL" last week referring to the presentation to Mr. George Newton, by inadvertence Mr. J. A. Ransome was described as *the* Managing-Director of the Richmond Gas Stove and Meter Company, Limited. His proper designation is Joint Managing-Director—the position being occupied in conjunction with Mr. H. M. THORNTON, who, it will be remembered, is also the Vice-Chairman of the Company. The correction is necessary, in order that there may be no misapprehension on the subject.

By the mail received at the end of last week from America, we learn, with very sincere regret, that Mr. A. G. GLASGOW was not (at the time the letter was written—Dec. 8) by any means restored to health. For the previous week or two, he had been slowly—but very slowly—recovering; and a fortnight since he left for Atlantic City. The seriousness of his illness (which appears to have been nervous collapse centering in the stomach) is evinced by the statement that "it is feared that it will be yet many months before he is able to take up any work." With ourselves, his many English friends will join in fervently wishing him a speedy and complete restoration to health.

The staff at the Inchgreen Gas-Works of the Greenock Corporation recently met at a social gathering in the Tontine Hotel to do honour to Mr. B. CARPENTER, the Resident Engineer for West's Gas Improvement Company, Limited, whose contract for the stoking machinery at the works is nearly completed. During the evening, Mr. W. Ewing, the Gas Manager, who presided, presented Mr. Carpenter, in the name of the staff, with an engraved silver cigarette case, suitably inscribed, as a remembrance of his association with the Inchgreen Gas Department. In making the presentation, the Chairman said that during the past eighteen months Mr. Carpenter, by his energy and ability, and his genial and obliging disposition, had gained the respect and esteem of all with whom he had come into contact. Mr. Carpenter made a suitable reply, in the course of which he said he had received the utmost kindness and assistance from the Engineer and staff at Inchgreen, and his knowledge and experience were extended by the peculiar local difficulties which had to be overcome.

Last Thursday evening, Mr. JAMES PARKINSON, the Town Clerk and Gas Engineer of the Brighouse Corporation, was the recipient of very substantial tokens of the esteem in which he is held in the town, in the form of gifts to Mrs. Parkinson and himself on the occasion of the celebration of their silver wedding and the completion of his 25 years' work in the borough. The presentations were made at a representative gathering in the Council Chamber, over which, in the unavoidable absence of the Mayor (Alderman Hirst) through illness, the Deputy-Mayor (Alderman Smith) presided. The gift from the tradespeople and general public of Brighouse consisted of a silver tea and coffee service and a silver tray. On the same occasion, the past and present officials presented Mr. and Mrs. Parkinson with a handsome writing-table, accompanied by an illuminated address; while the members of the Town Council and personal friends expressed their esteem for Mrs. Parkinson by asking her to accept a diamond brooch. Mr. Parkinson suitably acknowledged the gifts.

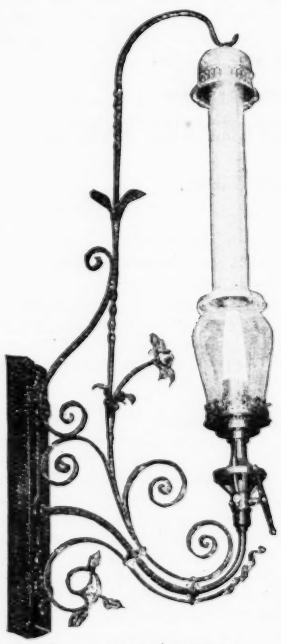
New Gasholder at Fordingbridge.—An additional holder has been completed at the works of the Fordingbridge Gas Company, Hants. It includes a concrete foundation, and a steel tank 43 feet in diameter and 17 feet deep. The frame comprises eight standards, with finials, and cross bars all of solid steel joists, with diagonal tie-rods. The tank is arranged to receive a double-lift holder; but the inner lift only is provided at present. The Contractors for the ironwork were Messrs. S. Cutler and Sons, of Millwall; and it was designed by, and erected under the superintendence of, Mr. Norton H. Humphrys, Assoc.M.Inst.C.E., of Salisbury. The inlet and outlet pipes are 8 inches in diameter, the contents of the single lift is 20,000 cubic feet, and the total cost (including connecting up to the meter and governor house, 100 feet distant from the holder) was well under £1000. Considerable difficulty was experienced during the progress of the work on account of the abnormally wet season. The soil was saturated with water nearly up to ground level, necessitating steam pumping; but, notwithstanding this, the whole has been completed within four months.

TECHNICAL RECORD.

GAS EXHIBITS AT THE CRYSTAL PALACE.

With Notes on Improvements and Novelties.

The circumstances under which only some half-a-dozen firms are at present, and will continue to be until the middle of January, representing what at one time bid fair to be an exhibition of an extent far exceeding anything of the kind that has been held for many years past are too well known to need repetition. The fact that the exhibition is not on the scale of what was anticipated cannot, however, through those circumstances, be made a reason for casting opprobrium upon it; on the contrary, we shall endeavour to show that, limited though it is in the classes of exhibits, it has points about it which merit the attention of all gas men—particularly in the matter of high-power and incandescent lighting. The most apposite description of the exhibition is "little, but good." There is not much to attract attention about it in the daytime; but when we say that after dusk, there are to be seen side by side, with little space intervening, the Lucas light, the Millennium light, the Keith light, and the Welsbach high-power lamps fitted with Plaissetty mantles, it will be seen that there is, in this respect alone, sufficient attraction for anyone interested in the gas industry. This is the first exhibition in a public place in this country of the Millennium light—true, it is



METHOD OF APPLYING THE LUCAS LAMP TO INDOOR BRACKETS.

FITTINGS FOR ADAPTING THE LUCAS PRINCIPLE TO EXISTING LAMPS.

only a small installation. It is also the first time that there has been a public demonstration with the Plaissetty mantles and with such a variety of Lucas and Keith lamps as are to be found at the Palace. These examples of high-power lighting, however, do not exhaust the interest of the small show. There is a new mantle which offers what is expected to be an improvement in the method of forming the fabric; and there are stands furnished with excellent displays by the Davis Gas-Stove Company, Limited, of London, and the Imperial Stove Company, of Leamington, as well as one exhibiting meters of all kinds as made in Holland. If there had been a stand or two of domestic gas-fittings, the exhibition would have fairly represented what can be done to-day in the various branches of lighting, heating, and cooking. Moreover, the demonstration of powerful gas lighting is made more complete by the thoughtfulness of the management of the Crystal Palace in retaining in use down the South Nave the electric arc lights, which are shown by their temporary neighbours to be impostors in respect of their boasted candle power. There is a piteous wanness about them in the presence of the high-power gas lamps. While commiserating with them, we hope the comparison will be allowed to continue.

THE LUCAS LIGHT EXHIBIT.

We will deal with the exhibits in the order in which they claim notice as one walks from the Centre Transept. First there is the stand of Moffat's Limited, showing the Lucas light; and it is

a brilliant illustration of the expressive phrase "*multum in parvo*." The Company are, indeed, making a great display in a small space; and when we say that, with the whole of the fitted lamps alight, they aggregate, according to an approximate computation, an illuminating power of 40,000 candles, it will be gathered that in the evening there meets the view something which cannot fail to attract visitors from other quarters of the Palace. The stand is well fitted; and there is another feature about it both pleasing and striking. Those who remember the Lucas lights when first brought to this country will recollect that, while their lighting power was great, the lamps were not altogether things of beauty, and their application was somewhat limited. Things have changed considerably since those days, and now of styles there are many, and in the adaptability of the system the only end is found at the points where high-powers are not required from a single source. Wherever the position in which a high-power light is wanted, there is a form of Lucas lamp on the stand which can fit it. This shows that Moffat's Limited have not been idle, and that they have made numerous departures that are worth looking into. The lamps on view are rated at 200, 400, 700, and 1000 candle power for indoor and outdoor lighting. In indoor lighting, it is seen that anything from a church down to a billiard table can be catered for in the matter of light; and, for outdoor work, lamps are there suitable for large open spaces down to the fittings necessary for adapting the principle to any existing public lamps that are of sufficient size. In the centre of the stand is an obelisk fitted with a 700-candle power light at the top, and at the sides are illustrations of how the system can be applied to interior wall lighting. This is accomplished by brackets of a highly decorative design. At the corners of the stands are examples of 1000-candle power street-lamps, with opalescent globes, and other forms on wooden columns are also seen. Several forms of interior lamps are suspended from the framework of the stand. The system has obtained such an extended adoption, that a more detailed description of the exhibits is not called for.

Imperial Stoves and the Millennium Light.

Congratulations must be tendered to the Imperial Stove Company, who occupy the succeeding stand, on three points—first on their enterprise in bringing such a large collection of exhibits from Leamington; secondly, on the progress (of which these exhibits are the evidence) that they have made in the short space of two years and nine months since they established themselves; and, thirdly, on the fact that they have their stand illuminated by the Millennium light, which is the latest aspirant to favour in this country among high-pressure systems, and will therefore draw to the stand more than ordinary interest. The installation of the light is not a large one, consisting of only ten burners; and it had to be put in rather hurriedly, and in a temporary fashion. However, the ten burners are erected on a high iron framework built up round the large stand; and in this situation they are—the mantles not being shielded in any way—very much subjected to the opposing draughts which exist in the Palace at a little height above the floor-level at this time of the year. This is a point to which, in fairness, attention should be directed, and some allowance made. The stand and its surroundings are flooded with light; and that is not astonishing when the information is tendered that the ten burners aggregate something like 14,000 to 15,000 candle power when burning under ordinary conditions. The consumption of gas, at the time of the inspection, was 360 cubic feet per hour; and it was being supplied at a water-gauge pressure of 54 inches. The compressor was running smoothly, and was being driven with a 2-horse power electric motor, though a ½-horse one would more than suffice for the work. The usual cost per 1500 candles is calculated, with gas at 2s. 6d. per 1000 cubic feet, to be 1d. per hour.

But we must turn to the exhibits on the stand below; and the most important line is found to be the series of Imperial cookers, to the production of which, it is seen, scrupulous attention is devoted. A cheaper form of cooker is the "Sandringham;" and a still cheaper type is the "Royal Windsor," which is unpacked, and specially made for slot purposes. The special cooker of the Company combines several novel and commending features, which deserve fuller notice. The first point has reference to the hinges. Instead of lugs being cast on the frame for forming the hinge for the door, a pair of malleable jaws are simply screwed on to the frame of the cooker, and into these the hinges on the door fit, and are completed by the insertion of removable pins. The advantage claimed for this form of hinge is that, if the jaw is damaged, it can be readily renewed, whereas, when it is cast on to the frame, it means that the cooker is put out of action, and has to be taken completely to pieces for repair. Thus time, money, and gas consumption are lost. Then, instead of the gas connection for the oven being carried into the side, it is brought round to the front; and the connection with the oven burners is so made that, by releasing two screws, the supply jets can be taken out for cleaning. Then there is a lifting top, so that the boiling-burners and griller can be got at without removing the bars. Any accident by the top falling when raised is guarded against, by teeth being cast on to the bridge, and with these teeth a ratchet engages, so that, when the cornice is raised, it can take any position—either upright or slanting—without any chance of falling. Another provision which prevents the loose boiling-burners being misplaced by carelessness is that, in addition to the ordinary method of attachment, a cast-iron pin is fitted to the burner which slides into a hole in the bridge; and this is certain in its intended effect. A large double gas-cooker for hotel use is another feature, and a hot-plate is seen which can be taken to pieces and packed for transit in a case 10 inches wide and 10 inches deep. Yet it is a solid piece of work. Smaller hot-plates, and of varying sizes, are also exhibited. In these, the bars are slightly raised above the flame, so that there is a passage for the heat, and, the vessels being lifted well off the frames, there is, it is claimed, more perfect combustion. A griller with lifting top is another speciality. In this, the grill can be turned by hand, so that the gas-connection can be on either side to suit the situation. In addition, there is a small lever at the side, by simply touching which the grill can be turned for either grilling or boiling. A carving-table, which is a splendid piece of work, occupies one end of the stand.

Two or three notes should also be made on the Company's gas-fires. They inform us that they are doing a very good business with fires with aluminium fronts, in which there is long life and wear. The fires so fitted have certainly a very clean and refined appearance. But about the fronts of the Company's fires generally, there is a novel feature. They are all quite independent of the fires; and are kept in position merely by two screws, so that, without the fire being put out of action, by removing the screws, the front can be carried away for cleaning, and, in fact, sent right away to the makers or elsewhere, without inconvenience, if necessity demanded. When the front is taken off, the burner can also be slid out without any disconnecting. These points apply not only to the aluminium fronts, but to all others; and therefore, if people are of the mind, they can have a variety of fronts for change. A convenience is also found in this interchangeability in show-rooms, where different fronts can be fitted to the same fire one after the other, for the choice of consumers, without occupying the space that would be required by a number of complete fires. One other point about the aluminium fronts is this, that their cost is only about 10 to 15 per cent. more than iron bronzed fronts; and they are almost of everlasting wear. The Company make a very effective display.

The "Incomparable" Fire.

On a small side stand is evidently a newcomer in the way of a gas-fire; but it has a strong family likeness to the older styles of fires. It is called the "Incomparable," and is made under "Smith's patent." What the special structural features of the fire are we do not know; but whatever they may be, they are said in a circular found lying on the stand to produce the following "important, novel, commercial advantages: (1) Impossible under any circumstances to light-back; (2) complete combustion; (3) No explosions; (4) absolutely silent in operation; (5) no smell or unpleasant odours; (6) greatest caloric or heating power; and (7) saves 30 per cent. in gas consumption."

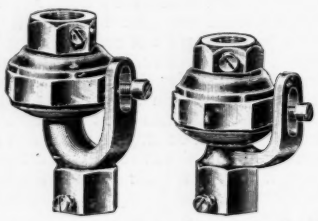
The Keith Light, and Some Improvements.

The James Keith and Blackman Company are in possession of a stand covering a large amount of space; and they make a very fine show. They have, it is manifest, gone to considerable expense in fitting up a substantial iron framework to the stand, finished off with ornamental scroll work at the top, and in taking down to the Palace a quantity of very heavy apparatus. We will glance cursorily at the high-pressure lighting exhibits, and devote a little special attention to recent improving introductions. Suspended from the centre framework is a "Taj" lantern containing a 2000-candle power cluster (six burners); and a little above this is a naked cluster of three burners, each of which is of 1000-candle power. These 1000-candle power burners are a fresh development of the Company's system. The principle on which they are constructed is practically the same as the smaller power burners; it is only in the details that alterations are found. They each consume 33 cubic feet of gas per hour; and the mantles used are 5 inches long and 2½ inches in diameter. The light is perfectly dazzling, and, of course, is only suited for large spaces. On the corners of the stand are four hexagonal lanterns, fitted with clusters of three burners; and these are being utilized to demonstrate the variety of the fittings that can be supplied with the lights to meet requirements. For example, by one arrangement, one, two, or the three lights can be used as needed. Round the stand are numerous fittings; arc lanterns for one, two, and three gas-burners, with inclined and straight shades, being prominent. Then there are various forms of reflector fittings; with electric lighters, flash bye-pass cocks, &c.

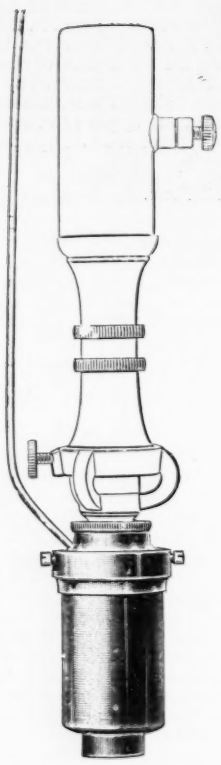
There are two arrangements of compressing plant for the supply of the lights; each one being more than capable of serving the whole of the lamps, and, for demonstration purposes, they can be used alternately. There is the regular pattern No. 3 compressor worked by water pressure; and a No. 3 (entirely enclosed) compressor, operated by a small electric motor of only $\frac{1}{10}$-horse power. Any small power machine other than electric can be employed equally well. There are points about this enclosed compressor that we have not hitherto noticed. The holder is completely covered in; and the covering in is so accomplished that the arrangement supplies an anti-fluctuator in itself. This method (which has only lately been devised and patented) has been applied to various forms of the compressors. Formerly, to avoid fluctuation, a large air-pipe was used; but this was not found practicable. Now what is done is this: From the inlet of the compressor, a large supply of gas—in fact, as large as the supply to the machine itself—is bye-passed to the top above the

holder; and the action on the holder is such that it exactly compensates for the intermittent pumping action of the pump. A new pattern of No. 1 compressor is also worked on this principle, being entirely enclosed; and there is no perceptible motion outside. On exhibition, too, is a new pattern of No. 4 compressor.

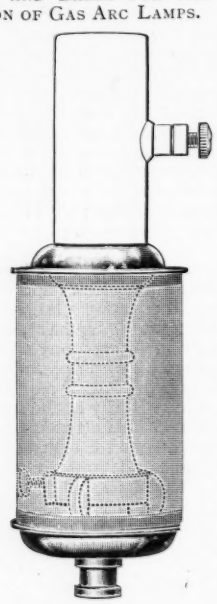
A few smaller interesting specialities of recent production are also pointed out to the visitor. Some of the ordinary connections for the heavy lamps have been found deficient in certain respects; and so the Company have given them attention, and are now making their own. For instance, there is a cup and ball used for the arc lamps, which is so made as to prevent the lamps turning round. Then there is a similar device, with an off-set on it, to suit the inclined shade lamps. The inclined shade causes the lamps with an ordinary cup and ball to set a little bit on one side, and so this new cup and ball is made one-sided too; and this produces a proper balance. Another useful contrivance is seen in a dust-catcher which fits the lower part of the Company's burners. This is particularly valuable for factories in which there is dust flying about. The "catcher" is made, in the form of a cylinder, of very fine gauze, and fitted top and bottom with a brass ring; and, to keep it in position, a little stamped fitting is screwed on to the bottom of the burner. The cylinder presents a big surface of fine gauze, which will take a long time to get filled up; and it offers a sure protection to the burner from dust or other material floating about in the air, which would otherwise be drawn into the air-inlets. Among other auxiliary articles is found one in the invention of which great ingenuity has been displayed. It is arranged to light and extinguish burners by the increase or decrease respectively of the pressure of the gas. The idea of doing this is not a new one; but we do not remember any device which has survived any long practical test. But the Company are convinced that they have a good thing here; and the tests so far prove it to be unfailing. Under the low pressure only the bye-pass is maintained alight; but when the pressure is increased above the point to which the device is adjusted, the lamps are lighted up, and the bye-pass jet is almost extinguished. When the pressure is reduced, the supply to the burner is closed, and only the bye-pass remains alight. The usefulness of this arrangement will be found in places where several high-pressure lamps are in use. It is an extremely simple device, and works by a little drop of mercury. On another part of the stand are found boilers, hot-water radiators, hydraulic rams, ventilating-fans, and a model of an oil-gas plant the same as is used in the lighthouses at Ailsa Craig and Langness Point—all of which are splendid specimens of the excellent work turned out in the departments other than lighting of the Keith and Blackman Company.



New Cups and Balls for the Suspension of Gas Arc Lamps.



Burner Fitted with Mercurial Seal to Light and Extinguish by Raising or Lowering the Pressure.



The New Dust-Catcher for the Keith High-Pressure Burners.

Davis Gas-Stoves.

A well-stocked stand has been fitted up by the Davis Gas-Stove Company; and it shows those who have not been brought into contact with their manufactures lately that they have been keeping them well up-to-date. The Company adhere, and very properly so, to the title that has become so well known—"Metropolitan"—for the principal series of their gas-cookers, of which they display several. In the same class is seen the new "Diamond" cooker, with its loose enamelled linings and burners, which facilitate cleaning. There is a good selection of grillers; and, in fact, every conceivable article appertaining to culinary operations in which gas can be used will, a glance round the stand suggests, be found here—all displaying good workmanship. In the gas-fire section, attention is attracted by the register "D.G." gas-fires; and the ease of their application and their usefulness is shown by being fitted complete with mantels and tiled hearths. The combination is excellent; and the high heating power of the fires is declared, by actual use, to every passer-by. The "Derby" fire also claims notice, for its efficiency, and on account of its cheapness and suitability for any room. There is an excellent collection of condensing-stoves, one of which, with a pretty variegated glass front, invites, and will not fail to obtain, admiration.

The Plaissetty Mantle.

The gas expert will be tempted to stay some little time at the stand of the Plaissetty Mantle Syndicate, Limited; for there he will find that so well bedded is the confidence of the Syndicate in their particular mantle that they have provided a photometer-room in which is a bar photometer (and in a few days it will be supplemented by a Simmance-Abady "Flicker" photometer), in order that those competent to do so may test for themselves the light-giving power of the mantle. In the sight of all observers, too, is a machine, driven by a small air-motor, for subjecting the mantles to violent lateral and vertical shocks, so that their strength may be demonstrated. A full description of the special process employed in the manufacture of these mantles has appeared in the "Journal;" and therefore there is no necessity to repeat what has already been published. The inquiry has frequently been made as to why so little has been heard of these mantles since that publication. It is no secret that the sole licensees and manufacturers for the United Kingdom are now the Welsbach Incandescent Gas-Light Company; and the change has been responsible for the delay. We believe that, directly the Welsbach Company are prepared to commence business in the mantles, they will be advertised under the name of the Welsbach-Plaissetty mantle. The Plaissetty Syndicate retain all the Colonial and Foreign rights and export. However, the excellence of the lighting power of the Plaissetty mantle is proved, at the Syndicate's stand, by its use in a collection of the different types of Welsbach lamps; and this fact imparts additional interest to the display. There is seen the Welsbach self-intensifying lamp of 600-candle power; and a small self-intensifier brought out by the same Company for fitting in ordinary street-lamps. Single Kern, "C," and other burners and clusters, are fitted (with the Plaissetty mantle) in various other types of lamps; and in the case of the clusters, a two-way cock is shown, whereby two lights out of three can be extinguished when not required. The display of lighting is a striking one; and the merits of the Plaissetty mantle are completely proved.

As recently as October last, Mr. Horatio Ballantyne, F.I.C., F.C.S., made a report on the mantle, which may be conveniently noticed here. He states that an examination of the mercerized tissue at the various stages showed it to be regular in thickness, and to afford an oxide skeleton of uniform thickness and character; also in shapeliness, uniformity of length, diameter, and weight, the mantles leave nothing to be desired. Each mantle examined weighed 0·75 gramme, including the asbestos—equal to 0·68 gramme of oxides per mantle. In tests to ascertain the durability of the lighting power, Mr. Ballantyne ascertained that the illuminating power fell only 1 candle during 450 hours' burning—viz., from 17·5 to 16·5 candles per cubic foot of gas consumed. If the limit of useful life of a mantle be taken as the time when it ceases to give more than 10 candles per cubic foot. it would appear from a curve of results accompanying the report, that the limit would not be attained by the mantle till after 1000 hours' burning. Regarding the tests he applied to ascertain the physical strength of the mantles, he remarks: "I know of no fairer criteria of the strength of a mantle, under ordinary conditions of use, than the vibrator tests; and they leave no doubt that the mantles which I have examined excel in strength any other thoria-ceria mantles that I have met with."

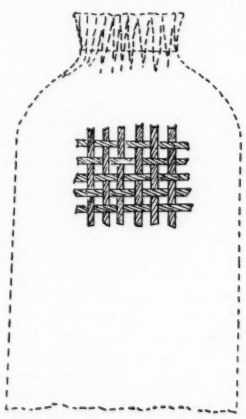
The George Wilson Meters.

Coming next to the stand of Mr. George Wilson, of the Hague, some fine examples of highly finished meters are seen; and the interest of gas engineers will be diverted by the display made into a comparison of these productions of a neighbouring country with our home manufactures. In passing, it may be noted that Mr. Wilson will soon rank among the competing firms in this country, as he is establishing works at Coventry for the manufacture of his various types of meters. The central object of interest on the

stand is a splendid specimen of a 200-light dry meter, with plate glass panels all round, so that the mechanism can be critically examined. Of prepayment meters there are several, some of them (made for exhibition purposes) in glass cases. The first is a $2\frac{1}{2}$ cents dry meter; and indicators are fitted to it to show the number of coins inserted, and how many have been exhausted by an equivalent consumption of gas. Inquiry of the attendant elicits the fact that in Holland prepayment meters have obtained a considerable use; and he mentions the Hague, Rotterdam, Utrecht, Haarlem, Zwolle, Groningen, and several smaller towns that have taken them up extensively. Then he shows a jumping-index for large station meters, fitted with a cylindrical tell-tale and clock. This form of index can be read off at a glance. Close by is a 10-centime slot-meter for use in Belgium. Dry meters—5-light and 100-light—(some fitted with English registration) claim notice, following which are observed various types of pressure and exhaust registers, and a 10-light experimental meter. Still taking the exhibits in the order of their disposition, a second form of station meter index with ordinary dials, and fitted with cylindrical tell-tale and clock, is seen; and next to this is a 5-light wet meter. Though several places in Holland have a preference for wet-meters, the representative tells us that the majority favour drys. Mr. Wilson has been very successful in obtaining medals and diplomas for his manufactures at exhibitions on the Continent; and from what is seen, their award has without doubt been fully justified. Another branch of his business is mainlaying; and there are several photographs round the stand of special pieces of work in this line.

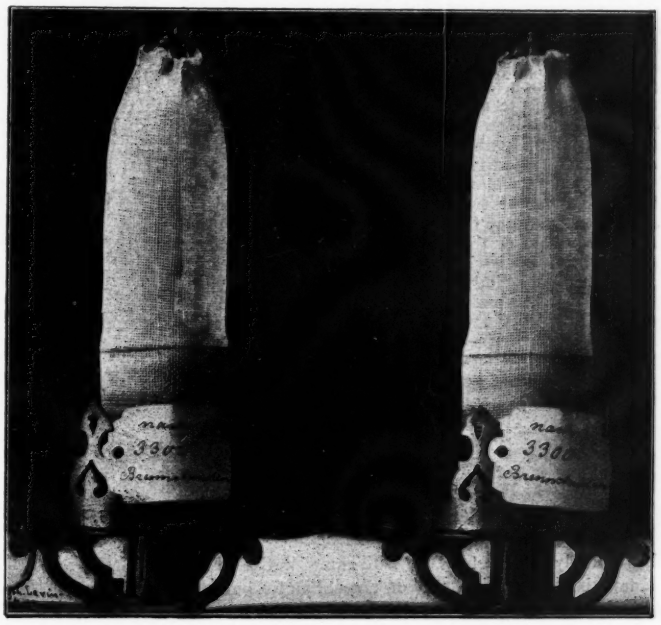
The d'Heureuse Mantle: Woven (not Knitted) Fabrics.

In visiting the next stand, which is in the occupation of Herr d'Heureuse, of Berlin, we are introduced to what is (to the best of our belief) an innovation in the making of gas mantles; and after hearing the patentee's explanation in regard to it, the question occurs to one, Why is it that up to the present it has been the invariable practice in the manufacture of mantles now on the market to knit the stockings which form their base and not weave them? The answer suggested is that the production of mantles being, in the greater part, one of chemical concern, the manufacture has fallen almost completely into the hands of chemists, and that they have, through want of knowledge of the textile industry, preserved an attachment for the first method of preparing a mantle stocking. It is in the weaving of the stockings, which gives to them a totally different structure, that Herr d'Heureuse's mantle differs from others. As he puts it, the invention consists in "interweaving two or more sets of parallel fibres, threads, or other filaments, of which each set crosses the other." We give an enlarged illustration to show the character of the resulting fabric. The disadvantages which Herr d'Heureuse finds in knitted mantles are these: First, that the fabrics are extremely elastic in consequence of the looped formation, which results in many bends in the filament composing the fabric; secondly, that, on the removal of the combustible material by burning, and in the subsequent heating of the mantle when in use, considerable shrinkage takes place, which causes the loops and bends to become smaller in radius, and thus to be drawn closer together; thirdly, that not only is the light-giving surface of the mantle in this way considerably reduced, but the fabric becomes less pervious to the gases and flame; and, fourthly, the bending of the loops into a smaller radius also diminishes the elasticity of the individual filament, and so renders it less capable of resisting shocks.



Herr d'Heureuse contends that these various objections to the knitted fabric are entirely obviated by the weaving. In the woven material, he states, the bends of small radius to which the filament in knitted fabrics is subjected are avoided, the light-emitting capacity of the mantle is increased, it is rendered more durable, shrinkage takes place to a less degree, the individual filaments are bent to such an inappreciable extent that their elasticity and capability of withstanding shock is conserved, and the openness of the structure being preserved, its permeability to gases and flame, and therefore its light-emitting capacity, is increased. Furthermore, the crossed construction is said to provide greater strength to resist deformation. These circumstances all contribute, it is claimed, to prolong the life of the mantle.

Mantles the fabrics of which are woven with warp and weft in the manner described are what are to be seen at this stand fitted to burners, in addition to which there are a number of impregnated fabrics in an unburnt-off state, so that their character can be better examined. Herr d'Heureuse is convinced that weaving is an improvement; and we are inclined at present to think that he is right. Handling the fabric, it is found that it will not stretch after the manner of the knitted fabric; and, whichever way it is tested, it appears to have throughout a uniform strength and resisting power. An opportunity was afforded of testing against other mantles samples of the d'Heureuse kind with the vertical and lateral shock machine on the stand of the Plaissetty Mantle Syndicate; and they showed great tenacity. Neither in the vertical tests nor in the lateral ones witnessed did the mantle break away from the shoulder, and that is where knitted forms frequently give trouble. Another testimony to the strength of the mantle is the fact that a number of those on view at the Palace have been brought uninjured from Germany, burnt off but uncolodionized. The mantles in use, too—of course they had not been in service long at the time—had not lost their shape in any way; and it must be said of them that, on ordinary "C" pattern burners, their incandescence was good. On the point of illuminating power, the following report by Dr. Drehschmidt, the Chief Chemist at the Berlin Gas-Works, may be of interest:—



Photographs of the Mantles Tested by Dr. Drehschmidt—after Burning 3300 Hours.

Hours of Burning	1		1500		2000		3200	
Pressure in inches	$1\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{1}{8}$
Gas consumption (Berlin quality)—								
Per hour, cubic feet	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{1}{4}$	$4\frac{5}{8}$	$4\frac{1}{4}$	$4\frac{1}{2}$
In litres	119	127	126	134	121	131	120	129
English candles	84	90	$68\frac{1}{2}$	73	71	75	61	65
Hefner candles	92·5	100·1	76·0	81·3	78·4	83·7	66·9	72·6

Highest light obtained after 3300 hours, without regarding the gas consumption: 75 English candles = 83·5 Hefner candles.

This figure of 3300 hours is also interesting on the point of duration, though the patentee (while he claims an extension of life compared with knitted mantles) does not ascribe to the mantle in ordinary use any such longevity as that here indicated.

The mantles by the way are made of ramie. For high-pressure lighting they are of stronger and coarser threads and tighter weave; and these conditions are alterable according to the pressure of the gas with which they are to be used. This reminds us further that at present the mantles for ordinary burners are made in two weaves—one a little stronger than the other. The mantle is worth investigating by gas men visiting the Palace. As one authority on mantles puts it, "the wonder is that the weaving of the mantle fabrics has not been thought of or done before; and it really seems to be a good thing."

Determination of Sulphur in Coal and Coke.—A modification of Eschka's method for the determination of sulphur in coal and coke, by Herr R. Nowicke, has appeared in various technical publications. According to an abstract in the "Journal of the Society of Chemical Industry," a gramme of finely powdered coal or coke is mixed with twice this quantity of composition consisting of one part of sodium carbonate and two parts of magnesia, and placed in a platinum crucible. A vertical depression is made in the mass, the lower portion of the crucible heated to dull redness, and oxygen passed through the lid. The mass is stirred with a platinum wire every five minutes. The combustion is complete in from 20 to 30 minutes. The contents are then extracted with water, and the usual course followed.

THE DE BROUWER DISCHARGING MACHINE.

The De Brouwer discharging machine has now been perfected, and, as in the case of the projector, the Derby Gaslight Company are going to be the first in this country to have it installed; the Directors having—under the advice of their Engineer (Mr. J. Ferguson Bell)—placed an order with Messrs. W. J. Jenkins and Co., of Retford, for one for the Cavendish Street works. The machine is designed to push the hot coke out of the retorts, which are 18 feet through, and will be installed on the opposite side of the retort-bench to that on which the D. B. coal-projector is at work. When the new pusher is erected (which is expected to be early in the New Year), the installation will then be complete, both the charging and discharging being effected by these simply mechanically operated machines.

The coal-projector, of which we gave a description in the "JOURNAL" some two months ago, continues to give complete satisfaction. Since the machine for charging was put into operation, the whole of the retorts at work at the Cavendish Street station have been charged by it without the slightest hitch or stoppage of any kind due to the charger or conveying plant. The gas made from small Yorkshire washed pea nuts has averaged considerably over 11,500 cubic feet per ton, which is a decided increase on former good hand charging—owing, no doubt, to the regular and even charges. The cost for carbonizing is phenomenally low. We hope, later, to give a full description of the new discharging machine.

A PAPER ON ELEVATING AND CONVEYING MACHINERY IN AUSTRALIA.

Queensland has its Institute of Engineers; and the members have lately been interested with some of the latest information obtainable in this country on the subject of elevating and conveying machinery. The information was laid before them in a paper by Mr. Robert R. Ferrier, who is the representative in Sydney of Messrs. Graham, Morton, and Co., Limited, of Leeds, and has a complete staff there capable of dealing with all matters appertaining to mechanical elevating and conveying. This is interesting, as it looks as though Mr. Ferrier is going to vigorously prosecute in the Antipodes the question of labour-saving by mechanical means.

However, it is to the paper that we have to direct attention; and it may be said of it that, the author, without diving into detail, made a good general survey of his subject, and in an interesting manner. In his opening, he told how in those countries especially where the rate of wages is high—as in Great Britain, America, and Australasia—there is a growing tendency to supersede manual labour by machinery. It is a necessary economy. Passing on, he mentioned the toilers who are "the slaves of ancient custom," and made a hit at those people who are hostile to machinery, and believe in having the brow wet with honest sweat, so long, of course, as the brow is not their own. Fortunately for the progress of mankind, the mechanical engineer has never looked at affairs in that light. Hence to-day, we have very efficient machines for transporting material from place to place, raising it from lower to higher levels, and submitting it to various forms of treatment during its journey. With a brief reference to the origin of conveying and elevating plant, Mr. Ferrier discharged himself on the point as to the almost numberless types of goods to which mechanical handling and transporting can be applied. Not long since he had the opportunity of inspecting some fine installations of plant, and was greatly impressed with the design and construction of several types of elevators and conveyors in use. The thought then naturally occurred to him, that, if manufacturers in the Old Country, where labour is so much cheaper than in Australia, are moving more and more in the direction of their adoption, surely there should be many opportunities for their successful introduction among the industries of Australia. He impressed upon his hearers, however, that there is one thing that should be kept in mind. To no other sphere of work does the old axiom, "That which is worth doing at all is worth doing well," apply more forcibly than to the design and construction of elevating and conveying appliances; for too often, instead of finding himself with labour-saving appliances, the user wakes to the fact that he has adopted labour-making appliances. Intending users should therefore be careful how they proceed in the way of design and construction. The industry is, comparatively speaking, a new one, and due caution should be exercised in deciding upon and obtaining the class of elevator or conveyor likely to be best adapted to the work required to be done. Its success or otherwise depends not only on the general construction, but greatly on the careful attention to small details in design and manufacture, which actual experience alone has fitted the makers of such plant to decide. For the heavier duties, steel is almost universally used in the construction of the framework and movable portions of the conveyor; the advantages being that it can be made more rigid, requires fewer supports, is cheap to erect, can be more easily dismantled when this is necessary, and re-erected at another site; and that the danger from fire is practically *nil*.

Describing some of the more frequently used types of conveyors and elevators, Mr. Ferrier turned attention first to the gravity bucket conveyor. This he characterized as a very fine type of conveyor, which has been largely adopted in power stations and storage plants. Such conveyors can be arranged to traverse every floor of a building from cellar to roof; and the direction of motion may be changed as frequently as desired from the horizontal to the vertical, or *vice versâ*, provided the direction of the runs of the conveyor be retained in the same vertical plane. These conveyors are being made up to a large size. The steel buckets are constructed up to 18 inches long by 15 inches wide by 12 inches deep; but he says there is no reason why these sizes should not be increased if the size of the material to be handled necessitates it. The character of the design and the mode of application require such conveyors to be made very strongly, to minimize the probable chance of breakage. It is therefore rather costly. Having described the construction of this form of conveyor, and its operation, the author succeeded with some notes on push-plate conveyors, which, he remarked, were a favourite type, and have been adopted for many duties—among others for conveying and distributing coal and coke. The features of the various forms of these were explained; and he mentioned that those for heavy duties are usually fitted with forged steel chains, having suitable attachment links to which the steel push-plates are fastened. The usual speed for these conveyors is about 70 feet per minute. Outlets are arranged at any desired positions along the middle line of the bottom of the channel steel trough—such outlets being fitted with valve-plates for the purpose of regulating the discharge when necessary. In many cases—especially when used for filling and distributing coal into the storage bunkers over boilers, retort-benches, &c.—the outlets are left full open, thus allowing the coal to be self-trimmed along the bunkers. The valve-plates only require to be worked should it be necessary to deposit the material at a particular part of the bunkers.

Steel belt and steel tray conveyors were next noticed, and their adaptability to many different purposes and conditions shown. Among his points, the author said that they are specially suitable for carrying heavy substances; are made up to large widths; can be placed either horizontally, or only a portion of the conveyor can be horizontal and the other portion run at an angle to the horizon, if desired; or, furthermore, can be arranged at an angle up to say 35°—thus forming what may be termed an elevator conveyor. When it is necessary to discharge the material otherwise than at the end of the conveyor—for instance, to distribute the material in large storage bunkers or buildings—the flat steel belt conveyor is adopted; throw-off carriages or ploughs being fitted at approved centres to effect this duty.

Passing the following section of Mr. Ferrier's paper (which dealt with spiral or worm conveyors), some remarks on the jigging shoot conveyor are found, which is a class that has largely come into operation of late, and is particularly adapted for conveying and distributing material of small size, and of a friable character. Rubber belt conveyors likewise receive treatment, and then the structure of elevators is taken in hand in a general way. Among many other things about them, he noted that bucket elevators are now being constructed up to very large sizes and of great lengths; and he has seen them close up to 90 feet long from centre to centre, with buckets 30 inches wide, closely spaced—the whole of the work being of strong design, the buckets securely bolted to massive forged steel roller chains placed at the back of the buckets, and guide-bars being fixed to run on angle-steel guides faced with green-heart or tallow-wood.

Having described the more frequently-used types of conveyors and elevators, Mr. Ferrier told his Queensland audience, in a sketchy way, what is being done in introducing such appliances in factories, &c. This is what he said regarding gas-works; and, though not mentioned by name, the Granton Gas-Works will come to the mind of the reader.

Elevating and conveying appliances have been adopted to a very marked extent for the many duties in connection with coal, coke, &c.; and in one very large works that I had recently the pleasure of going through, I saw probably one of the finest, if not the finest, of existing installations. Practically all the work was effected by mechanical appliances. The works in question have been laid out on a gigantic scale. It is expected that in time there will be seven units of buildings and plant—each unit comprising coal-stores, carbonizing, washing, and purifying plant, and holders, capable of dealing with 1000 tons of coal per day.

It may be of interest to you to have an outline description of the processes to which the coal and coke are subjected from the time the coal arrives at the works in the trucks, until the coke is placed in the trucks ready to leave the works. The coal is received in railway trucks. These trucks are usually fitted with end discharge doors. Arrangements have been made for emptying several trucks at once—these being run to certain positions adjacent to the coal-elevators, and tilted by means of hydraulic tipping-rams. The coal is discharged direct on to a steel-belt conveyor, which is fitted with speed-regulating gear. This conveyor feeds massive coal-breakers, which are capable of crushing 140 tons of coal per hour from pieces of a very large size to the small gauge required in the carbonizing plant. From the breakers the coal is fed into either of two large elevators, having buckets

30 inches long, and placed at close centres, almost continuous. These elevators deliver on to a push-plate conveyor running across the retort-house, which in its turn distributes the coal into push-plate conveyors running along the house and delivering the coal into the storage bunkers over the lines of retort-benches. I may here mention that the retort-benches, of which there are four, each contain fourteen settings of nine retorts each, or a total of 504 retorts. These retorts are erected on the inclined system, and are 20 feet long. As the plant was designed to carbonize 1000 tons of coal per day, each retort has therefore to deal with 2 tons of coal per day. Between the storage chambers and the feeding mouths of the retorts, automatic measuring and sure-feed appliances are arranged. The measuring is done on the shot-pouch principle; the various slides being neatly worked by means of small hydraulic rams. The experience gained in connection with this setting of inclined retorts, together with controlling the feed into the retorts, has enabled the engineer to make this part of the operations wonderfully successful; and the various appliances can be accurately adjusted to accommodate themselves to the class of coal being used.

The coke from the retorts runs direct into the regenerative furnaces underneath, or into the hot-coke conveyors. Want of space prevents me from describing this class of conveyor, but I may say that a great deal of attention has been paid to the design of suitable conveyors for this arduous duty; and there are at present several designs which are giving great satisfaction. The conveyor trough is covered in with hinged plates; only those being opened up which are directly under the retorts being emptied. The coke dropping into the conveyor passes into a practically closed box, where it is quenched by water, and in many cases exhausting-fans have been fitted to draw off the fumes; thus making the duties of the attendant of a less obnoxious character. The conveyors at the works in question are between 400 and 500 feet long. After they leave the retort-house, they are run up at an angle, in order to gain the required altitude over the screening-plant and coke-storage bins. Arrangements have been made to separate the coke into different sizes and to store the various classes in large bunkers, under which the trucks are run and filled as required.

The coal-store, which is arranged parallel to, and at some distance from, the side of the retort-house, is fully equipped with elevator and distributing conveyors, capable of dealing with large coal up to 18-inch cube. The trucks are emptied in the manner previously described, being tilted by means of hydraulic rams. A steel belt conveyor receiving the coal from the trucks, either feeds a coal-breaker or delivers direct on to the elevator conveyor as required. The elevator conveyor, which is of the plate type, and is arranged at an angle of nearly 35°, has been fitted with angle-pieces to prevent the coal from running back. The conveyor is capable of handling up to 150 tons per hour, and delivers the coal on to another large plate conveyor, which runs the full length of the coal-store. Steel ploughs are fitted at intervals to discharge the coal from the belt conveyor down into the store. The purifying plant has also its equipment of elevating plant. Movable elevators have been arranged for the purpose of transferring the oxide, &c., from the purifiers and distributing it on to a floor arranged above the purifiers. The whole of the plant is suitably roofed in to protect it from the weather.

In the Midlands of England, where coal is transported and delivered to factories in barges, there have been erected several very interesting installations of elevating and conveying plant.* A movable vertical elevator is arranged to command the barge, and is suitable for working at all states of the tide, also accommodating itself to the varying draughts of the barge as the coal is discharged. The elevator is set to work on one end of the barge; it then clears the coal away until it is down on the floor. The barge is then traversed under the elevator just as required. Telescopic shoots are arranged at the top of the elevator for the discharge of the coal on to the conveyor, and in order to acommodate itself to the vertical position of the elevator. Conveyors take the coal into storage bunkers or stores. These plants, of which there are several, work very efficiently indeed.

Sufficient has now been said, I think, to indicate the general trend of conveying and elevating machinery. It is a department which affords immense scope for ingenuity, and not a little room for improvement and better adaptation, as the uses for such machinery increase and multiply.

At the annual meeting of the Institution of Civil Engineers, intimation was given, both by the Council and by the President (Sir W. H. White, K.C.B.), that it is proposed to arrange for a party of members to visit the United States next September. The proposal is made in response to a cordial invitation from the Board of Direction of the American Society of Civil Engineers, who have signified their desire to render the visit as agreeable and profitable as possible. It is presumed that many of the members will desire to carry out programmes of travel in the United States which they may wish to arrange individually; and, allowing a fortnight for such excursions, they will be enabled to visit the Universal Exhibition at St. Louis at or about the time of a Congress of Engineering, which is to be held there during the week beginning the 3rd of October.

* For an illustrated description of plant such as is here referred to, see "JOURNAL" for Sept. 29, p. 811.

THE STORAGE OF FLOOD WATER.

By Professor HENRY ROBINSON, M.Inst.C.E.

[From a Paper Read before the British Association of Water-Works Engineers, Dec. 12.]

The year 1903 will be long remembered for its excessive rainfall, and I have thought that some data with reference to it would be of interest.

I am indebted to the Astronomer Royal for the following records of the rainfall at the Greenwich Observatory:—

MONTHLY RAINFALLS FOR 1903 (JANUARY TO OCTOBER).

	Rainfall.	Average for Fifty Years (1841-1890).	Departure from Average.	Number of Rainy Days.
	Inches.	Inches.	Inches.	
January	2·13	1·99	+0·14	18
February	1·37	1·48	−0·11	10
March	2·20	1·46	+0·74	18
April	1·85	1·66	+0·19	11
May	1·95	2·00	−0·05	15
June	6·07	2·02	+4·05	10
July	5·27	2·47	+2·80	13
August	4·82	2·35	+2·47	17
September	2·24	2·25	−0·01	15
October	4·44	2·81	+1·63	24
Total to end of October	32·34	20·49	+11·85	151

I am indebted to Dr. Mill for the following records of the rainfall at his station at Camden Town during 1903:—

	Inches.		Inches.
January	2·15	July	5·20
February	0·83	August	4·24
March	2·30	September	2·64
April	2·14	October	6·03
May	2·99		
June	6·43		34·95

From the above table it will be seen there are three months with over 5 inches of rainfall; whereas since 1858 there have been no two consecutive months with over 5 inches. Seven days in the year at present have exceeded 1 inch; and two others have exceeded 0·90 inch. In 1878 (the wettest year), there were five days exceeding 1 inch. The average rainfall for the 45 years ending in 1902 (as given in "British Rainfall"), was 24·99 inches, so that this year is already 9·96 inches above the average. Dr. Mill informs me that the rainfall in the Thames Valley for October must have averaged the large amount of 7 inches.

In calculating waste-weirs for reservoirs, it is necessary to know something of the possible rainfalls during limited periods; and the following are some data on the subject:—

Locality.	Depth in Inches.	Time.	Date
London (Camden Square)	0·51	5 minutes	1878
,, ,,	1·00	10 ,,	1878
,, ,,	1·80	20 ,,	1878
,, ,,	3·28	90 ,,	1878
Cowbridge (South Wales)	2·90	30 ,,	1880
Mellington Hall (South Wales)	4·80	120 ,,	1895
Thames (Beddington)	3·50	60 ,,	1903
London (Camden Town)	6·43	110 hours	(June) 1903

The last case is remarkable for the length of time during which the exceptional rainfall continued.

The proper utilization of the rainfall of this country is one of national concern, and deserves and demands a more comprehensive treatment than it has hitherto received, although the necessity for such treatment has long been recognized. The President of the Surveyors' Institution, in his address last month, pointed out that, whereas in 1870 the urban population was 15,097,000 and the rural 15,787,000, the urban population in 1900 had increased to 29,559,000, but the rural had decreased to 11,898,000. As the water to supply this increasing urban population is derived from rain falling on an area which remains constant, there is need for grave consideration as to how the future is to be met.

The subject was considered at a conference at the Society of Arts in 1878; and it was hoped that some action on the part of the Government would have followed. It was suggested (as it has often been since) that the existing unsatisfactory boundaries of districts admitted of modification with a view to making watersheds the natural boundaries. The same view was expressed at the conference which I presided over in London in 1900 on "Water Supply and River Pollution." Mr. C. E. Jones brought the matter before this Association in 1900 in his interesting paper on "The Nation's Supply of Water and its Effective Control." Last year the President of the Local Government Board received a deputation (in which this Association joined), when the pressing necessity for an inquiry into the law relating to water supply was urged. The Commission on Sewage Disposal, in their third report, refer to the questions of centralization and the formation of "River Boards."

Legislation has hitherto been initiated by authorities who aim solely at providing for the necessities of their own communities; and this has been the basis on which watersheds have been placed under control. Nothing, however, has been attempted to deal with this important matter in a statesmanlike way, with a view to the proper conservation of all available water for the needs of the

future. The monopolization of large sources of water supply for the requirements of smaller populations than the sources are capable of serving, results in communities being deprived either now, or at no far distant time, of what is necessary for their existence. That a new Government Department should be created to deal with this subject has been urged constantly; and though past experience does not make one too hopeful of seeing this much-needed action taken, yet it behoves us to be insistent as to the necessity for it.

Since 1864, more than twenty futile attempts at legislation have been made to deal with the conservancy of rivers and the mitigation of floods. The floods caused by the excessive rainfall during the period of 1875 to 1883 directed attention to the desirability of legislation for the better conservation of the enormous volumes of water flowing off the gathering-grounds, and their utilization for the benefit of the community, at the same time effecting improvement of the rivers. The years of severe drought which have occurred since the foregoing periods of excessive rainfall caused widespread inconvenience and loss, and every engineer engaged in dealing with the question of water supply has felt the need of these extremes being adjusted.

In other countries the necessity of conserving the excess water for periods of drought is recognized. In Russia, flood water is collected in reservoirs, and is utilized for irrigation and other purposes. India affords an example of the conservation of the rainfall on broader lines than are adopted in this country. We have an example in Egypt, where the construction of the Assouan Dam will lead to the storage of water with great advantage.

The question of river pollution is a factor to be taken into account; but in legislating to prevent pollution, care must be exercised to meet the varying conditions that obtain in different rivers, because considerable elasticity as to standards, &c., is imperative. It was at one time regarded as an axiom that river water which was once polluted remained polluted, and was incapable of being utilized for the supply of towns. Years ago I combatted this view with others who held the opinion that organic matters passing into polluted rivers met with conditions unfavourable to their producing harmful results except for a limited time, and that they disappeared during the flow of the river, owing to oxidization and the action of aquatic vegetation. Temperature, light, vegetation, the absence of suitable food, and the general environment are unfavourable to the permanent existence of organic impurities, and to their propagation.

The passage of water through a large reservoir from the point where it is admitted to where it is withdrawn, is attended with a well-recognized purifying action. It may now be taken as settled that the old restrictions which were placed on storing flood water have been removed, and no longer apply unless the pollution is of an exceptional character. Only a few years ago, the quality of water was determined by chemical analysis. Now bacterial investigations enable a better knowledge to be gained of the living or organic impurities, which have to be studied, and which are really the important factors.

The exclusion of what were called doubtful streams, and the objections to flood water, caused many sources of supply in the past to be only partly utilized, which, in view of present experience and change of opinion, now admit of being brought into use. I might give as an example the River Thames. I have had to examine the valleys of several of its tributaries with a view to the construction of impounding reservoirs, and can state that flood waters can be conserved at small cost from more than one gathering-ground that I have investigated in detail, which would meet the future requirements of the Metropolis. At the same time that this can be accomplished, the volume flowing in the River Thames in periods of dry weather could be increased, whereby the river would be greatly improved, both from a sanitary and a navigable standpoint.

By impounding flood water, the flow could be equalized in rivers from which water can only be abstracted for supply purposes when the volume reaches a definite amount. If the minimum flow is increased, the period of abstraction could be greatly extended; and where this is done by pumping, the installation would be on a correspondingly reduced scale.

Although the exposure of water to light results in the destruction of hurtful organisms, this beneficial action should not be regarded as operative where filtered water is collected in service reservoirs for domestic supply, because light conduces to the growth of vegetation, the decay of which would tend to deteriorate the quality of the water. Hence the general practice of covering service reservoirs.

Discussion.

Mr. C. H. Priestley (Cardiff), in a written communication, stated that the rainfall on the Cardiff gathering-ground in Breconshire had exceeded the average of the last fifteen years by some 40 inches. The total up to Dec. 11 was 109·81 inches. The highest figure was in October, 19·43 inches; and the lowest in April, 3·51 inches. The quantity of water passing over the waste weir from the 4000 acres of gathering-ground had exceeded 8000 million gallons; and this was flood water, which they could not store. Regarding the statement of Professor Robinson that he had had to examine the valleys of several of the tributaries of the Thames, with the view to the construction of impounding reservoirs, and could state that flood waters could be conserved at small cost from more than one gathering-ground which would meet the future requirements of the Metropolis, he (Mr. Priestley) said, if this could be done without unduly interfering with the flow of the river, it was a most important thing, and should have the careful consideration of all interested in the water supply of London. As to the last paragraph of the paper, they had at Cardiff both open and covered service reservoirs. Some of the older ones were open; and he found very little, if any, growth of vegetation in them. It was not necessary with all waters to cover service reservoirs; but it might be with some waters, and under certain conditions.

Dr. H. R. Mill, D.Sc., LL.D., remarked that there was not perhaps any great utility in speaking of large figures; but it was a point not to forget that water was the largest import of this country. It was some 200,000 million tons per annum upon the average; and this year it had been increased by fully one-half. It was too early to say that this year would be unprecedented in the amount of rainfall; but it was probable it would be so. The only years to compare with it were 1852 and 1872. He also pointed out that in the third table in the paper the last line ought to be separated from the others in order to avoid misconceptions. The figures given first of all referred to consecutive numbers of minutes; but the hours of rainfall in the last line were not consecutive. It seemed to him to be a very serious waste that so large an excess of water as that which had fallen this year was allowed to run away, and leave nothing to help to tide over dry years. Of course, there was, to a certain extent, natural storage—the water soaked in underground, the level of saturation was raised, and the wells were replenished. But it should be within the power of water engineers to make such provision that, when an abundance of rain such as there had been this year was thrust upon them, it was not all lost. Another point was that he now and then came across gathering-grounds on which there was no measurement of rainfall. There should be rain-gauges on every gathering-ground, which ought to be scrupulously attended to. He should be glad at any time to send gratuitously full instructions for setting up rain-gauges, with forms for duly recording the results.

Mr. Baldwin Latham pointed out that the question of what was a flood had not yet been determined. Was it, he asked, the quantity of water beyond the average of any one year, or the quantity beyond the average of a number of years? They ought to know what they were dealing with, and to that end there should be more recording-gauges established—not only to record the quantity of water which fell, and the rate at which it was falling, but also as to the quantity and time of the flow off the ground. The collection of data of this kind would confer a boon upon the profession generally.

Mr. C. E. Jones (Leyton) said the question as to what was done with the rain was from many, if not from all, points of view of vital importance to the inhabitants of this country. That we obtained a sufficient fall—and more than sufficient—to satisfy any possible requirements of the people of these isles, was beyond question; and the waste was frightful to contemplate. He was a strong advocate for impounding the water; and he hoped that something would soon be done in this direction of a practical and tangible character. They heard from Dr. Mill that this was the wettest year on record. His own records fully bore this out. Up to that morning, at his own station, he had totalled 35·87 inches; and this, he took it, was unprecedented. Before the year was out, probably 3 feet would be measured. They also learned from Dr. Mill that the figures for the mean average fall of this country were too low; and if this were so, it had an important bearing on water-works construction, inasmuch as it entitled mill owners and riparian proprietors to a larger measure of compensation water. It therefore followed that larger compensation reservoirs would have to be provided in the future than had been in the past. This would be a great gain to mill owners and others interested in the streams. The conservation of water and its utilization was essentially and imperatively demanded. If they travelled the lowlands of Essex that day, they would find them like a sea; and it was within his recollection that hundreds of thousands of acres had been under water three or four times during this rainy season. The loss attending this disgraceful state of things called for a remedy. Another point, from an engineering view, was the potential of water at an elevation. The enormous incalculable aggregate of power that was lost by water falling from high elevations down to the sea was something stupendous; and yet there was little, if any, effort made to utilize it. Proceeding to refer to the Thames Valley as an ideal gathering-ground, he remarked that the water which fell into this area was more than sufficient to supply any possible needs of the inhabitants of Greater London, even if the population doubled to-morrow. He believed that Dr. Mill had stated that about ½ inch of rain was the quantity that was actually utilized for potable and ordinary domestic purposes—more than ½ inch sufficed out of a total rainfall of 35 inches! Surely there was no need to go to Wales to supplement the water which was easily accessible in the Thames Valley. But, from his point of view, it was necessary that more water should be impounded in the Thames and Lea Valleys. Since the Thames was embanked years ago, the water had risen in the lower reaches to a dangerous extent; and he should not have been surprised in the least if London had been inundated this last month. He said most advisedly that there was considerable danger to the Metropolis, unless large reservoirs capable of impounding flood waters were constructed. The system inaugurated by the Water Companies up the Thames could be easily extended from

time to time; and the removal of the danger by the impounding and utilization in dry seasons of these waters appeared to be one of the easiest engineering schemes possible. He also asserted that experience had shown that the local authorities of the country were incompetent to approach this question of water supply in a liberal and comprehensive spirit; and concluding his remarks he said that, until there was a Government department which would map out the country into watersheds, fix the gauges that had been spoken of, and thus relieve to a large extent those willing workers who had hitherto maintained the British Rainfall Association—if they did this, and then ascertained the rights of everybody within the watersheds, and saw that they were secured, without fear or favour, it would be a work that would redound to any Government with the highest honour.

Mr. C. SAINTY (Windsor) said at their pumping-station they kept daily records; and, before he left home, he took out the figures for October, and the total up to that morning. The total was 39·73 inches. In October, Dr. Mill (the paper showed) registered 6·03 inches. His own figures were 6·7; so that this was very near the 7 inches for the Thames Valley spoken of by Professor Robinson. It would be a great boon to them in the Thames Valley if there was the possibility of getting rid of this water. Directly there was a little rainfall, the people round about them were afraid that Windsor would be again flooded. Since the previous morning, the river had risen no less than 10 inches; and with the quantity of rain they had had, they might have another 10 inches by the next morning. If this was stored before it got to Windsor, it would save them a great deal of anxiety.

Mr. H. PRESTON, F.G.S. (Grantham) remarked that the figures they had had gave them the quantity of rain which fell in a definite space of time; but he imagined it would be particularly interesting if they could connect the amount of rainfall in some manner with the quantity of flood water they got in the rivers or at the bottom of the valleys. Supposing they had 2 inches of rainfall in an hour, what quantity per acre under the different geological conditions found in different seasons of the year might they expect to get from this 2 inches of rain as flood water, or as additional water in the valleys? It seemed to him there were some parts of the country where the process of Nature could be assisted in a manner different from that by which engineers were trying to assist it when making artificial lakes. When water percolated down into the rocks beneath, there they had an underground storage; and might they not, he asked, consider whether there were not places where some of the flood water, or some of the surplus water, could be favourably stored below? He remembered some years ago, when Northampton was getting short of water, that it was suggested that dummy wells should be sunk into the marlstone, suitable filtering material be put into the wells, and the ground or flood water should be turned in, and thus tend to increase the quantity of water which was being raised at the water-works wells. The only objection against this system appeared to him to be that no one could tell the course of the underground water—whether it would ultimately reach the wells where it was required, or pass away as an additional supply to springs elsewhere. However, the question might be considered by the authorities who provided money for surface storage whether there were not places where it was not advisable—sometimes at least—to have underground storage. The advantage might be exceedingly great.

Mr. T. MOLYNEUX (Stockport) remarked that, from the practical point of view, this question of storing water did not appeal to him. Probably they only had one wet year in four or five; and were they to make reservoirs to store the flood water of every fourth or fifth year? And what would the water be like after standing four or five years? Theoretically, the proposal sounded all right; but, from the practical point of view, it did not appear to him to be workable. Storage reservoirs cost an enormous sum; and what would it be if they had to deal with floods like they had had this year, and which might not occur again for many years.

Mr. W. H. HUMPHREYS (York) observed that the author made a remark as to the creation of a new Government department to deal with this question. This had been said for the last twenty or thirty years; and the thing was now for them to take it in hand, and endeavour to get one created. It was all very well to have a paper like this discussed, have it put in their proceedings, and then do nothing more. If anything was to be done, someone should take it up. It was a matter of the utmost importance; and he recommended that the Association should move in the matter. Professor Robinson also mentioned the subject of Rivers Boards. Unless anyone lived in a district under the control of a Rivers Board, he could have no idea of the immense amount of good such a Board did. In the West Riding of York they had a Rivers Board; and he had been astonished at the amount of good the Board had done in the time it had been in existence. Efforts should be made to secure the formation of more Rivers Boards. Regarding the subject of the exposure of water to light, he stated that at York they made daily bacteriological tests, and watched very closely the increase or the decrease of the average bacterial results. Lately they had been bothered by an increase in the number of the organisms in certain districts; and the result of their investigations proved that the organisms increased in a service reservoir which was of some 2 million gallons capacity. The result had been they had put this reservoir out of use altogether. They found that, in this open reservoir, in certain months of the year—July and August—the growth of *algæ* very rapidly occurred. This gave a slight objectionable smell to the water; and taking this growth and the increase in bacteria into consideration, they had come to the conclusion that the reservoir was useless to them.

Mr. PERCY GRIFFITH (London) said it was perhaps desirable that the point with regard to the question of Rivers Boards should be answered at once, because there were some present who might think the Association had not been following the matter up in the way Mr. Humphreys advocated. The Association had done so, and were continuing to do so. But Mr. Humphreys would realize that to move the Legislature in any practical way was not an easy task; and it took a good deal of time before anything could be done. But they might flatter themselves that, by what they had done, they had secured action on the part of the Government, which was something worth having, although perhaps it might be some time yet before it took a more practical form. Professor Robinson had told them that a deputation had waited on the President of the Local Government Board; and on the deputation the Association was represented. The author also stated that the Commission on Sewage Disposal, in their third report, referred to the question of centralization and the formation of Rivers Boards; but he had not gone so far as perhaps he might have done in reference to this report. Mr. Long, in his reply to the deputation, stated that, in his opinion, most of the points brought before him would probably come within the reference to the Commission on Sewage Disposal; and he therefore promised to lay the points before the Commission to deal with, so far as they came within the terms of their reference. The result was that, in their third report, the Commission had practically grappled with these very points; and, so far as they might look upon it as having any practical effect, they had carried out the suggestions made to them. They distinctly recommended the formation of Rivers Boards throughout the country, and further proposed the establishment of a new central authority in London, in connection with the Local Government Board, to have control over the action of the District Rivers Boards. Therefore, the Association might flatter themselves that they had influenced the Government to a certain extent; and they were now waiting for them to take some practical steps on the lines of the report of their own Commission.

Mr. W. G. PEIRCE (Richmond) added his testimony with regard to the covering of reservoirs. Some years ago he had charge of a reservoir in a Government establishment, the water from which was pumped from a chalk well. In the summer months there was a growth of *algæ* on the surface of the reservoir; and this compelled the Government officials to have it cleaned out once a fortnight. The growth was first like a kind of yeast on the top of the water, and eventually little red insects were formed. In the end the War Department ordered that the reservoir should be supplied with a galvanized iron cover; and this prevented the growth of the *algæ*.

The PRESIDENT (Mr. R. H. Swindlehurst, of Bolton) agreed with the author regarding the impounding of flood waters. In connection with one of their largest drainage areas, of some 2000 acres, they were compelled to deal with all the water that came off through one reservoir. This was originally constructed by the Board of Commissioners for the supply of the mills and works down the river; but in 1876 the reservoir was taken over by the Corporation, and used for town supply, so that they were compelled to deal with the flood water in the best manner they could. In 1881, he found that the water at the bottom of the reservoir kept turbid a great deal longer than at the surface, so he laid down an 18-inch syphon, about 11 feet from top water, and drew the water from the top in this manner. They had not found any difficulty in dealing with the flood water so far. He moved a vote of thanks to Professor Robinson.

Professor ROBINSON acknowledged it, and commented upon the valuable information the discussion had afforded.

Society of Engineers.—The annual general meeting of this Society was held on Monday last week, at the offices, 17, Victoria Street, Westminster, Mr. J. Patten Barber, M.Inst.C.E. (the President) in the chair. The following gentlemen were elected by ballot as the Council and officers for 1904: As President, Mr. David Butler Butler; As Vice-Presidents, Messrs. N. J. West, Maurice Wilson, and R. St. George Moore; as Ordinary Members of Council, Messrs. J. Bernays, G. A. Pryce Cuxson, G. A. Goodwin, W. H. Holttum, H. Sherley-Price, E. J. Silcock, J. W. Wilson, and G. Green; as Honorary Secretary and Treasurer, Mr. G. Burt; as Honorary Auditor, Mr. Samuel Wood, F.C.A. The President announced that the following premiums had been awarded by the Council for papers read during the past session: The President's Gold Medal to Mr. Douglas Mackenzie, for his paper on "Motor Transport for Goods;" the Bessemer Premium of Books to Mr. R. J. Thomas, for his paper on "Road Maintenance and Administration;" and a Society's Premium of Books to Mr. Albert Gay, for his paper on "Mechanical Stokers for Electricity Generating Stations." A vote of thanks was accorded to the Scrutineers; and the proceedings terminated by a vote of thanks to the President, Council, and officers for 1903. The annual dinner of the Society took place on Wednesday evening, at the Hotel Cecil—the President in the chair.

REGISTER OF PATENTS.

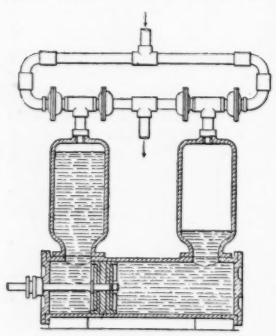
Conveyors.—Zimmer, G. F., of Mark Lane, E.C. No. 28,474; Dec. 24, 1902.

The objects of this invention are to increase the carrying capacity of vibrating trough or "swinging" conveyors, without increasing the speed of the driving shaft (and, in some cases, even the speed of the driving shaft is reduced), and to enable such conveyors to be driven by hand power.

The patentee says he has found that the volute springs at the end of the connecting-rods described in patent No. 26,606 of 1901 will allow the conveyor trough to make a slightly longer stroke than would be the case if the connecting-rod were attached directly to the trough without the intervention of the springs; but this only happens in the case of small conveyors. If the conveyors are long, or carry a heavy load, it is found that the springs, if allowed sufficient play to increase the vibration of the trough, become heated and lose their elasticity under the stress. It is also well known that the ordinary swinging conveyor does not begin to convey the material to be transported until the crank-shaft has attained a speed of some 200 revolutions per minute. Conveyors constructed according to this invention begin to move the load at almost any speed, it is said, by dispensing entirely with the connecting-rod or other device for rigidly connecting the trough to the driving crank, and substituting for it a means of driving which will enable the trough to swing freely, or by attaching the connecting-rod to the spring legs in such a manner as to allow the amplitude of the vibration of the trough to be greater than twice the crank radius—this latter method of construction affording a means for regulating the amplitude of the vibration of the trough. By these means, an increased amplitude of vibration may be imparted to the trough, so as to increase the carrying capacity of the conveyor, or conversely enable the conveyor to transport the normal quantity of material per hour with a reduced speed of the driving shaft.

Air or Gas Compressing Apparatus for use in Incandescent Lighting.—Howell, H., of Brixton, S.W. No. 965; Jan. 14, 1903.

This apparatus for compressing gas or air in incandescent gas-lighting installations wherein gas at high pressure is made use of, is said to be more readily adaptable to installations of varying capacity than the apparatus described in the inventor's former patent No. 5868, of 1902.



The apparatus comprises a horizontal cylinder, in which works a piston operated by a water or other motor, and to each end of which is connected a vertical extension. The horizontal cylinder and the vertical extensions are filled with water or other suitable liquid to such an extent that, when the piston is at one end of its stroke, the liquid in front of the piston will extend nearly to the top of the vertical extension attached to the cylinder in front of the piston, while the level of the liquid in the vertical extension behind the piston will be near the bottom of the extension, and *vice versâ*. It will thus be understood that, as the piston is reciprocated in the horizontal cylinder, the liquid in the two extension chambers will alternately rise and fall, and thereby act as pistons in the extensions or as means for expanding and contracting the chambers. To the top of each extension is attached an inlet-valve for the air or gas to be compressed, and an outlet-valve through which the compressed air or gas is forced into the supply-pipes for the burners.

In order to adapt the apparatus for different installations, it is only necessary to lengthen or shorten the horizontal cylinder, and to correspondingly increase or diminish the travel of the piston and the height of the vertical extensions.

Meter-Indices.—Thorp, T., of Whitefield, Lancs. No. 1541; Jan. 22, 1903.

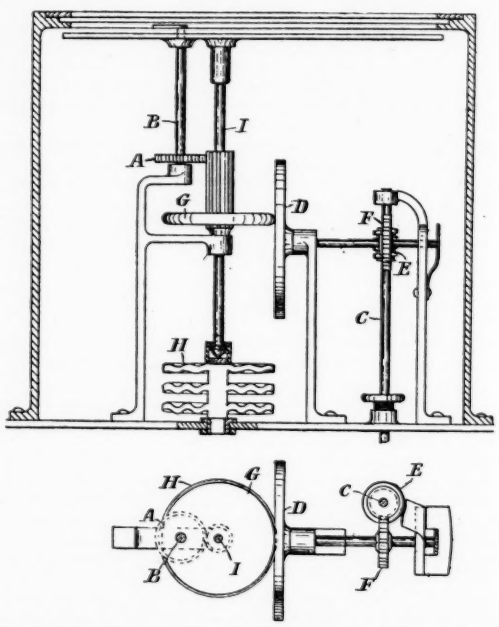
This invention, relating to the indices of meters, has for its object "to obtain a correct registration of the volumes of the gas as they exist at atmospheric pressure, whatever may be the pressure at which they are passed through the meter."

It is well known, the patentee points out, that the volumes of all nearly perfect gases vary inversely as the absolute pressures to which they are subjected. For instance, when subjected to a pressure of about 15 lbs. absolute to the square inch (or that of the atmosphere), the volume is double that at 2 atmospheres absolute, and so on—up to pressures much in excess of those to which gases are usually subjected. It follows, therefore, that if a gas be passed through any meter having the ordinary index-mechanism, the volume registered will only be that existing at the pressure at which the gas is passed through the meter at each moment; no account being taken of alteration of volume due to difference of pressure from the normal. The invention is particularly applicable to meters for measuring gases at the higher pressures now frequently used—such as station meters, especially when constructed on the turbine or rotary principle.

The principle of the invention is in the use of a variable ratio mechanism between the rotary shaft of the measuring organ and the index-fingers or pointers, in which the variations are automatically made by the differences in pressure. The variable speed arrangement proposed embodies friction discs for transmitting the motion of one shaft to another shaft at a right angle thereto, and obtaining the variable ratios between the two by varying the point of contact of the discs in relation to the centre of one.

The illustration represents an elevation of the mechanism for transmitting a variable ratio motion from the shaft operated by the measuring organ of the meter to the index-pointers, and a plan of same.

The index or registering mechanism may be of the usual form of construction; and the pointers are driven by the wheel A and shaft B, between which and the shaft C, operated directly by the measuring wheel, the variable ratio and controlling mechanism is arranged. The shaft C drives the disc D through worm or bevel gearing; one wheel or worm E being fixed to the shaft, and another wheel F being fixed to the shaft carrying the disc D. The latter shaft (carried by bearings) is allowed a small longitudinal movement against the pressure of a spring, by which the disc D is kept in contact with the disc G driven by it. The expansible chamber H is preferably formed of a number of circular chambers or hollow discs having flexible faces, and communicating with one another, and all with the measuring chamber of the meter, by means of a central passage around which the bottom hollow disc is connected to the measuring chamber, and those above it to one another. A spindle carried by a footstep bearing on the upper disc is adapted to slide in (say) the bearing upon which the spindle I of the friction disc G rotates. This spindle is of sufficient

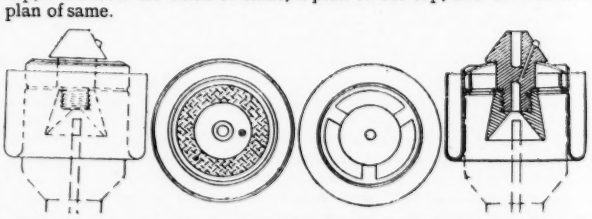


length below its bearing to allow for the rise or expansion of the flexible chamber H, which is normally in a collapsed state. In this condition, the disc G is in contact with the disc D near to its centre; and as the chamber H expands, the disc G is moved towards the periphery of the disc D. The spindle I has preferably a long pinion formed at its upper end, engaging with the wheel A in such a manner as to transmit its motion thereto, allowing for the expansion and contraction of the chamber H.

If, then, the frictionally-driven disc G be adjusted while the pressure in the chamber is atmospheric against the plane side of the driving disc D at such a distance from the centre that an increase of pressure equal to one atmosphere will move it a similar distance further from the centre, the train of wheels actuated thereby will move at double the rate they would have done had there been no pressure on the diaphragm or extensible chamber H, and register double the volume actually passing through the meter. But, as before stated, a pressure of 1 atmosphere above atmospheric pressure reduces the volume of the gas to one-half; consequently the registration will be that of the gas at atmospheric pressure. The same reasoning shows that at other pressures the differential rate of speed of the wheels of the index-train varies exactly in the same ratio; and so "correct registration is effected at all pressures."

Incandescent Gas-Burners.—Carpenter, C. C., of Old Kent Road. No. 4449; Feb. 25, 1903.

The patentee's object is to provide means whereby the burner-head can be lifted off the burner-tube without removing the mantle from the support; and the head will then constitute a stand for the mantle. The illustration shows an elevation of a burner with the improved top or cap, a sectional elevation of same, a plan of the cap, and an inverted plan of same.



The burner-tube, drawn in dotted lines, is of the usual kind, and forms no part of the present invention. The burner proper has a double wall so as to form an annular groove or channel into which the

lower end of the mantle, when in position, enters. The inner side of this double wall fits on to the burner-tube, while the outer side constitutes a shield, which permits of the burner being grasped for removal and replacement without touching the mantle.

Production and Carbonization of Gas for Heating, Lighting, Motive Power, or the like.—Lühne, J., of Aix-la-Chapelle, Germany. No. 8194; April 8, 1903.

The subject of the present invention is "a process and apparatus for the production and carbonization of gas for heating, lighting, motive power, &c., obtained from solid, liquid, or other substances by direct gasification or by distillation."

In the construction shown, the apparatus is essentially composed of two concentric generators. The interior generator is preferably provided with a moveable portion and a carburettor. The moveable portion is charged with materials for the decomposition, the reduction, the formation, and the fixation of the gas produced in the exterior generator, while an operation by means of the carburettor enriches the gas with hydrocarbons. The hydrocarbons, water vapours, &c., rising in the generator are maintained at a high uniform temperature, and entirely transformed into gas in such a way that no tarry product can be formed. The whole of the solid or liquid combustible is thus completely transformed into gas. According as the carburetting takes place directly in the apparatus after the separation of the gas or the gas already formed is enriched with hydrocarbons, the operation of the apparatus can be effected in two different ways—"by means of the combined generator carburettor, not only can the gases obtained by direct gasification or by distillation be enriched, but also gases for lighting or non-lighting purposes can be obtained, and all mixed gases can be carburetted and fixed."

Fig. 1 is the arrangement directly connected with a boiler for the purpose of gasifying brown coal, peat, &c. Fig. 2 is apparatus for gasifying anthracite; there being also a carburettor, and in addition a mixer of the vapour with air. Fig. 3 represents the apparatus for distilling combustible liquids.

The concentric arrangement of the generators A B enables the latter to be maintained at a uniformly high temperature by the combustion which takes place in the generator A. The position of the fire-grate varies according to the nature of the substances to be gasified. For bituminous coal, brown coal, peat, &c.. the sloping position of fig. 1 is most advantageous; while the horizontal position (fig. 2) should be used for dryer coal, anthracite, &c.

In order to facilitate charging, the interior generator contains a moveable portion C. The contents of C consist (for choice) of refractory substances used in the manufacture of gas—such as, for example, carbonate of aluminium, pumice stone, lime, carbide of calcium, iron-slag, &c.; also the supply may be several substances combined (see fig. 1), pumice stone (say) above while carbide of calcium may be below, to be decomposed by the gas or wet vapours passing through the generator.

The concentric arrangement of the generators, as well as the facility with which the portion C can be charged from outside the apparatus, are "essentially new arrangements for the production and treatment of gases, such as gas under suction, gas under pressure, water gas, &c." Moreover, the contents of the portion C form a sort of filter which frees the gas of dust and tar, and prevents any return of them—"a great advantage in the production of gas." But "most important of all is the treatment of the gases resulting from their gasification and passage through the incandescent contents of the generator B, which transforms all the hydrocarbons contained in the gases into perfect gas." The cap or dome above the central generator B is principally for the purpose of collecting and mixing the gases for reduction. If the cap is extended to the level of the combustible (as indicated by the dotted lines), the gaseous vapours—especially those saturated with hydrocarbons, and which tend to the formation of tar—accumulate between the cover and the wall of the generator A, and can be drawn

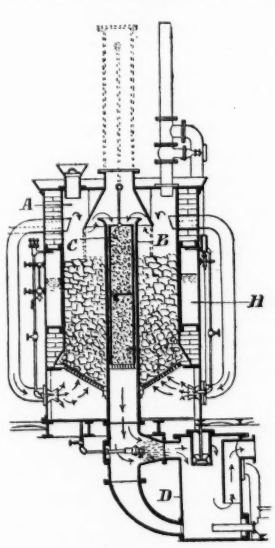


Fig. 1.

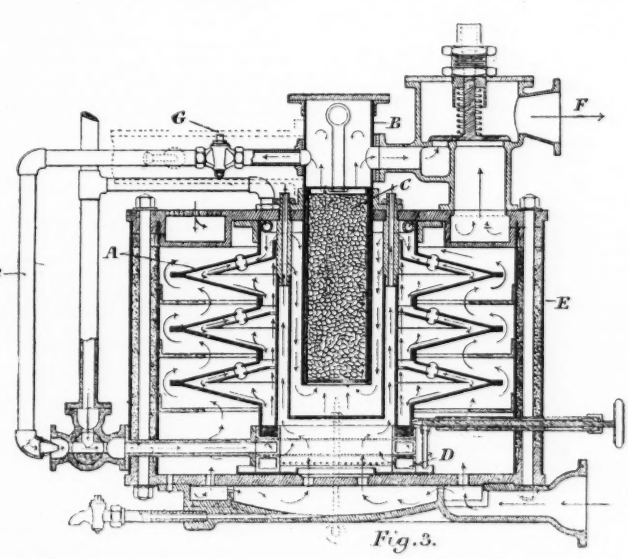


Fig. 3.

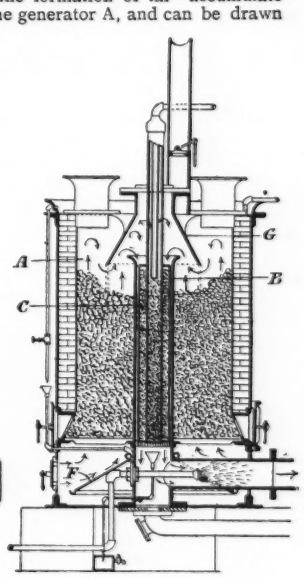


Fig. 2.

above the combustible through the side pipes by means of air or a mixture of vapours to be brought down and re introduced into the incandescent combustible. The effect of heating these vapours—which consist chiefly of incandescent carbonic acid, heavy hydrocarbons, water vapour, &c.—is to produce a mixture of gas consisting of hydrogen, carbonic oxide, and light gases of hydrocarbons.

The carburettor situated amidst the contents of the portion C of fig. 2, consists of an iron tube filled with iron-slag, &c., into which is inserted a pipe coming from outside and feeding the carburettor with liquid hydrocarbons under the pressure of a pump, or by a fall, &c. These hydrocarbons expand and evaporate in the iron-slag. Any liquid not decomposed—due to the too rapid supply to the carburettor is collected at the bottom into a receiver in the shape of a funnel, and flows outside into a reservoir to be used again. The vapours rise naturally into the carburettor, and pass below the cover G to mix with the gases produced in the generator A; and this mixture afterwards descends through the incandescent contents of the moveable portion C of the generator B, to finally emerge by the pipe shown. This arrangement "ensures the decomposition and the complete transformation into gas of the vapours of the hydrocarbons, &c.—those proceeding from the exterior generator A as well as those from the carburettor, in such a way that no formation of tarry substance can take place. In consequence, all solid, liquid, or gaseous combustibles treated in this apparatus are completely transformed into gas."

For carburation it is better to use inexpensive gas oils—petroleum, with the addition of alcohol, xylol, &c.—which serve the purpose of eliminating the naphthalene from mixed gas (coal gas together with carburetted water gas).

Fig. 3 shows a generator for the gasification of liquid substances. The exterior generator A is fed with liquid combustibles through a circular perforated pipe—by a pump or by means of a fall. The necessary temperature is produced and maintained by the furnace D, which is placed below the generator A, and can be fed by combustible fluids, either by produced gas or the waste gas from an engine, &c. The combustible undergoes partial distillation, by which the most volatile hydrocarbons are directly transformed into gas. The hydrocarbon gases as disengaged circulate in the direction of the arrows, into the interior generator B, and through the portion C, to be decomposed and fixed. The exterior generator is surrounded by a non-conducting covering E; and its upper and lower portions are united by bolts. The air required for heating enters through openings arranged all round the lower portion; while the escape of the gases of combustion from the furnace is effected through a lateral opening in the upper portion of the apparatus (not shown). The gas for heating rises in the direction of the arrows all round the exterior and interior generators, in such a way that the heating of these is uniform and rapid. The feeding of the furnace D—which is done either by combustible liquids or by gas produced in the generator—takes place through pipes having a three-way stopcock. The gas-pipe can also be regulated by the stop-cock G. The perfected gases can pass through the escape F, to be led to the place of consumption.

Such an apparatus could be combined for the feeding of engines which draw, through F, gas along with air drawn in and heated in the channel in the upper portion of the apparatus—the admission of the air being regulated by a valve.

Producing Air Gas for Lighting, Heating, and Power Purposes.—Casse, A., and Diguef, H., of Brussels. No. 13,633; June 18, 1903.

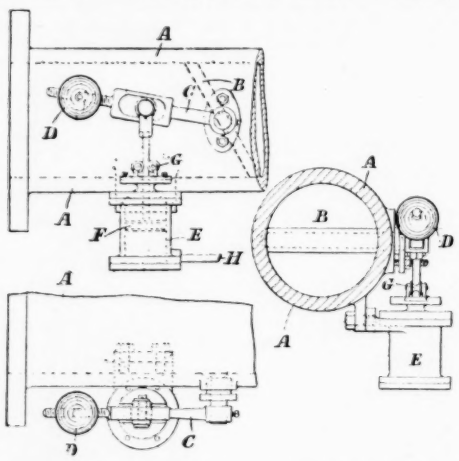
The patentees describe a general arrangement of apparatus for producing "astereogas" for lighting, heating, or power purposes, in which what they call air compressed in an automatic compressing engine or apparatus working with water under pressure, is forced into a carburettor, where it is saturated with hydrocarbons, to be subsequently passed through an automatic pressure-regulator before being consumed. The carburettor is formed of trays arranged above one another, and provided with overflow tubes in such a manner that the air is compelled to circulate above each tray before it leaves the apparatus. This carburettor is so arranged that the air, after passing through the oil contained in a lower reservoir, escapes into an upper reservoir,

having passed through tubes containing fibrous substances immersing into the oil of the lower reservoir. This air passes successively into a series of compartments separated by partition walls of fabric or capillary materials immersing into oil—the quantity being regulated by a float arranged in one of the compartments.

Controlling Pumps Compressing or Exhausting Gas.—Cargill, T., of Eckington. No. 16,199; July 22, 1903.

This invention, relating to means for controlling pumps compressing or exhausting air or other gas, provides a device for maintaining a given pressure or vacuum in a vessel by causing any fluctuations to supply or cut off power to or from the pumps. The invention may be applied to any pump compressing or exhausting gas into or from a vessel, by providing an expansible receptacle in communication with the vessel, and having an operative connection with some means for supplying or cutting off power to or from the pump—such as the throttle valve of a fluid-pressure engine, or a clutch or the like in the case of a bell-driven pump.

A is a portion of a steam-pipe leading to the inlet-valves of a fluid-pressure motor engaged in operating a pump to compress or exhaust gas into or from a vessel. The throttle-valve B is pivoted within the pipe by two trunnions, of which one is supported in a suitable bearing within the pipe A, the other passing out through a packed gland. A lever C is attached to the outer end of the latter trunnion by a set-screw, is slotted as shown, and has its free end screw-threaded. A weight D is provided with a correspondingly screw-threaded axial hole, and is screwed on to the lever C—being held in position by a set-screw. A cylinder E is attached to the pipe A by bolts engaging lugs on the cylinder and brackets on the pipe A. The cylinder is closed at its lower end, and contains a piston F, to which is attached a piston-rod



passing up through an aperture in the upper end of the cylinder. The free end of the piston-rod is forked; and between the prongs of the fork a roller is situated engaging the slot in the lever C—thus forming an operative connection between the piston F and the valve B. The piston-rod is preferably guided by two grooved rollers G, carried by brackets on the upper cover of the cylinder E or its extension. The brackets are bevelled, and engage correspondingly dove-tailed recesses in the cover, as shown. The brackets may thus be adjusted to bring the rollers G nearer to, or further from, the piston-rod, and may be secured in position by tightening bolts engaging tapped holes in the brackets. A pipe H is connected to the lower part of the cylinder E, so as to communicate between the latter and the vessel into or from which gas is being compressed or exhausted.

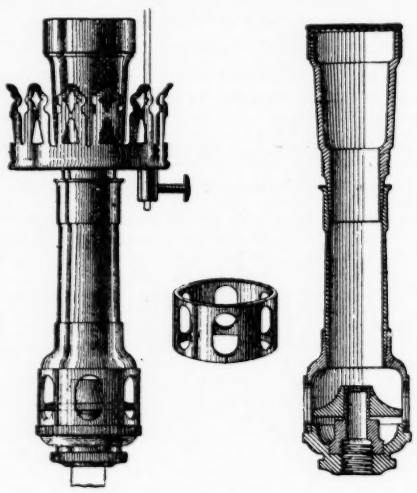
The operation of the device (which is designed for use with a pump compressing gas) is as follows: The weight D is adjusted on the lever C until it is counterbalanced by the maximum desired pressure within the vessel acting on the piston F. When this pressure is exceeded, it forces the piston upwards, and operates the lever C to close the valve B—thus stopping the motor. When the pressure falls, the weight D forces the lever C and piston F downwards, thus opening the valve B to restart the motor until the maximum pressure has again been reached.

If the pump is employed for exhausting gas, a precisely similar device may be used, with the cylinder E inverted, and the piston-rod extending down towards the weighted lever C. Or the device may be used in the position shown with the pipe H connected above the piston F; but in this case, the piston-rod would, of course, pass through a stuffing-box in the upper cover of the cylinder.

Incandescent Gas-Burners.—Thompson, W. P.; a communication from the Rath Light Company, of Wilmington, Delaware, U.S.A. No. 19,360; Sept. 8, 1903.

This invention of a burner adapted for use in incandescent lamps is characterized by the arrangement of controlled feeding passages, mixing chamber, and draught tube, "by which the admission of air and gas in the desired proportions is brought under perfected control, a perfected admixture of air and gas is obtained, increased efficiency and economy are effected, and the desired candle power or brilliancy is brought within ready control."

As shown, the mixing-chamber has leading to it a gas supply-passage controlled by a check which affects a perfected regulation and distribution of gas, controlled air-supply passages which effect the regulation and distribution of air, and baffling mechanism for directing the air—the mixing-chamber communicating with a draught-tube having an expanding outlet for spreading the gaseous mixture and the flame. By this means, "a positive regulation" of the flow of gas is said to be

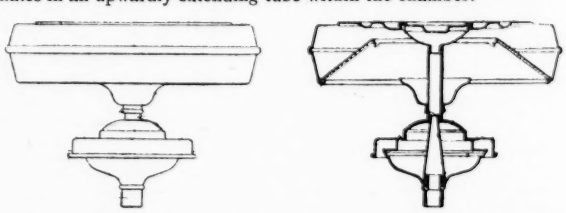


obtained, and a comparatively broad jet is maintained while the stream is gradually reduced from the maximum to the minimum as the ports formed by the apertures are closed.

Gas-Burners for Heating and Lighting.—Betts, L. F., of New York. No. 20,927; Sept. 29, 1903.

This invention has for its object "to provide an apparatus which shall have great radiating surface, and a burner therefor which shall produce the required heat and also afford brilliant illumination, and which shall be easily and cheaply manufactured and be neat and attractive in appearnnce."

The novel arrangements of parts and details are shown in the engraving. It will be seen that gas from the service-pipe (not shown) would pass through a tube or cone of wire gauze, or other equalizing distributor, and fill the interior of a chamber secured to the nipple. The chamber is shown with a dome-shaped upper portion having a central exteriorly screw-threaded boss and an annular shoulder, below which is a horizontal annular rim or deck, in which is a series of equally spaced small holes, through which gas from the interior of the chamber issues, and is burned in a series of vertical jets. The lower portion of the chamber curves inwardly and downwardly, and terminates in an upwardly extending tube within the chamber.



It is important in attaining the best heating results, says the patentee, that there be as many jets as practicable; and it is also important, in effecting the desired complete combustion, that each jet maintains its individuality, and does not mingle with the next in the series. These essential features are secured by properly spacing the jet-holes; and the free combustion desired is further insured by the employment of a cap applied on the upper portion of the gas-chamber, and having a hole serving to hold the cap concentrically thereon. The cap has an annular flange at the level of the shoulder, extending beyond the neck, and having an annular skirt or depending lip reaching a little below the level of the deck, and encircling the latter with a slight air space between. The flange is pierced with a series of openings, one for each jet-hole, and exactly concentric thereto—the desired position being determined and insured by matching an aperture in the flange with a swell or boss produced in the deck for the purpose. Each jet is thus supplied with the required volume of air delivered uniformly around the jet, and when the parts have become heated, the air supplied is warm, and "in the best condition to insure perfect combustion and produce an extremely brilliant white flame."

APPLICATIONS FOR LETTERS PATENT.

26,741.—Cox, J., "Incandescent gas-burners." Dec. 7.
26,823.—Pearson, J. T., "Street lighting." Dec. 8.
26,838.—Hamilton, J. H., "Internal combustion engines." Dec. 8.
26,889.—Shoob, I, "Gas-fittings." Dec. 8.
26,917.—Potter, W. G., "Inverted incandescent burners." Dec. 9.
26,918.—Potter, W. G., "Incandescent burners." Dec. 9.
26,919.—Potter, W. G., "Mantle supports." Dec. 9.
26,996.—Davis, G. E., "Ammonia stills." Dec. 9.
27,066-7.—Wright, J. W. B., and Darwin, H., "Incandescent lamps." Dec. 10.
27,121.—Barker, J., "Retort-lids." Dec. 11.
27,144.—Davis, H., "Controlling the flow of gas." Dec. 11.
27,175.—Fouché, E., "Gas blow-pipes." Dec. 11.
27,212.—Brennan, L., "Imparting stability to structures." Dec. 11.

LEGAL INTELLIGENCE.

HOUSE OF LORDS.

Monday, Dec. 14.

(*Before the* LORD CHANCELLOR, *Chairman*; *Lord* MACNAGHTEN, *Lord* SHAND, *Lord* DAVEY, *Lord* ROBERTSON, *and Lord* LINDLEY.)

Kent Water-Works Company and Another v. Lamplough.

This was an appeal from a judgment of the Court of Appeal on the 18th of March last, the proceedings in which were given in the "JOURNAL" for March 24 (p. 777).

Mr. CRIPPS, K.C., Mr. HALDANE, K.C., and Mr. R. J. PARKER appeared for the appellants; Mr. FLETCHER MOULTON, K.C., Mr. YOUNGER, K.C., and Mr. ASHWORTH JAMES represented the respondents.

The PRESIDENT said he had advanced the case on the representation of the Arbitrators in the Metropolitan Water Arbitration. He asked whether only one Company was to be dealt with.

Mr. CRIPPS said there were some incorporating clauses which made a distinction between the case of the Kent Company and other cases; but the decision could not help affecting the other cases, though whether it would absolutely govern them was another matter. The question really raised was as to the maximum limitation in reference to profits divisible by a Water Company which had incorporated the Water-Works Clauses Act, 1847. This was a matter which probably applied to all the Companies; but the only case now before the Court was that of the Kent Water-Works Company. This case would depend upon one or two sections of the Act of Parliament. The appellant Company was originally incorporated in 1809, and obtained other Acts in 1811, 1850, and 1862, with which he need not deal. Until the Act of 1864, the Company had no limitation of dividend; it might divide its profit upon anything it could earn, and was in the position of an ordinary Company. In 1864, the North Kent Water-Works Company, which was incorporated by the Kent Water-Works Act, 1860, with a share capital of £40,000, of which £20,500 had been partially paid up, was absorbed by the Kent Company—the North Kent Company at the time being subject to the provisions of the Water-Works Clauses Act, 1847. It was a comparatively small Company. The Kent Company was not subject to these provisions at all; and it was important to bear this in mind with regard to the particular section of the Act of 1864 which their Lordships would have to construe. This Act stated the amount of capital issued up to that date and the capital unissued—that was, the Kent Company alone. The total capital was £420,000, and the borrowing powers £105,000. The only question was as to the effect of the incorporation of the Water-Works Clauses Act, 1847. The matter arose with regard to the incorporation, by the Act of 1864, of the Water-Works Acts of 1852 and 1863. The capital of the Company was increased by the amalgamation by the £40,000 which the North Kent Company had power to deal with. The shareholders in the latter became ordinary shareholders in the larger Company. Then the borrowing powers were increased by the amount the North Kent Company had power to borrow. Section 27 was most important. It provided that the whole of the undertaking and water-works of the Company should be subject to the Water-Works Clauses Act, 1847. Its terms were specially appropriate to where there were two Companies, one of which (the North Kent Company) had already the Act of 1847 applied to it, and the other (the Kent Company) was having it applied for the first time. The Water-Works Clauses Act contained words to which some weight had been attached: "Be it enacted that this Act shall extend only to such water-works as shall be authorized by any Act of Parliament hereafter to be passed which shall declare this Act incorporated therewith." The *prima facie* object of the Act was for it to be incorporated in future Acts without the necessity of repeating particular clauses; and the question which arose in the present case was whether, in regard to a Company which was already existing with statutory powers, the provisions of the Act applied to the undertaking as a whole, or only to any future part.

The CHAIRMAN: You cannot answer that question in the abstract; it must depend upon the particular provisions.

Mr. CRIPPS: To a very great extent; and that is what I put to your Lordship. Proceeding with his argument, the learned Counsel said it was obvious that the main idea of the draughtsman was to provide a Consolidation Act, which was to be applied to future undertakings.

The CHAIRMAN said in one sense the amalgamated Company was a new concern.

Mr. CRIPPS said he did not put it in that way; but if that were so, they would get a condition of things extremely favourable to the Water Company, far more favourable than the argument he was putting—viz., that there was a limitation, and a limitation of the Water-Works Clauses Act, 1847. Then he came to the crucial section, section 75, which had to be very carefully considered, because a very technical meaning had been giving to some words. The section involved the crucial question which applied to all the cases: "With respect to the amount of profit to be received by the undertakers when the water-works are carried on for their benefit"—these words meant when carried on by a company as apart from a corporate body—"the profits of the undertaking to be divided among the undertakers in any year shall not exceed the prescribed rate, or where no rate is prescribed they shall not exceed the rate of £10 in £100 by the year on the paid-up capital of the company, which in such case is the prescribed rate." Supposing they had £100,000 of ordinary capital, it was quite obvious that the maximum limitation would be £10,000; and supposing that this £100,000 was partly preference and partly ordinary, they would still have £10,000 as the limitation. As between the shareholders, supposing £50,000 had been issued as ordinary capital and £50,000 as preference capital at 5 per cent., this was a domestic arrangement; and the preference shareholder would get his 5 per cent., and the ordinary shareholder 15 per cent. This point he had tried to explain to the Courts below; but in vain. They were dealing, not with what the shareholder got, because that was a domestic arrangement as to the terms on which the capital was issued, but with a limitation of the profits divisible in the sense of what the Company might divide. With what became of the amount among the various shareholders they had nothing to do; nor did that concern Parliament. The last part of the section also required careful appreciation, which referred to the power to make up "any previous dividend" which fell short of the yearly rate.

The CHAIRMAN: To put it shortly, I suppose the point is whether it means before or after amalgamation?

Mr. CRIPPS said that was a great deal of it. Whatever the latter words might mean, it was merely an arithmetical system by which one could arrive at the profit divisible by the Company in a future year owing to a deficiency in the amount divisible in some previous year, calculated on the 10 per cent. principle. On a capital of £100,000, if only £9000 was divisible in one year, in a subsequent year, if the profit was sufficient to allow it, £11,000 could be paid.

The CHAIRMAN: I suppose there is no doubt that that is the meaning of it, without reference to the complication of dissolution and reconstitution, and so on.

Mr. CRIPPS said he thought that was so; but he did not think the Court below had gone on that basis. They seemed to think there was some technical meaning in the word "dividend," and had been confused by the expression "back-dividend," which had been used. Of course, "back-dividend" was unthinkable to the legal mind in one sense. It was not a question of back-dividend.

The CHAIRMAN: Without prejudice to the other question which I suppose arises here—whether the word "previous" applies to before or after amalgamation—supposing the Company had continued without any disturbance, I should think it is quite manifest that that is the meaning of it.

Mr. CRIPPS said he would not trouble them further on this point; but the Court below seemed to think that this construction would involve complications.

The CHAIRMAN said he could imagine complications in one sense, because a shareholder in 1845 might not be the same as a shareholder in 1855; and there was no reason that the latter should have an increased dividend because the former had not had enough. He could imagine this sort of internal complication; but the application of the section seemed to be clear enough.

Mr. CRIPPS pointed out that the advantage of the 1845 shareholder was this—that he sold his share with the right attached to it, and the purchaser had the prospect of a higher profit.

The CHAIRMAN: You say it does not matter with regard to the individual who possesses; it is the share which is entitled to it.

Mr. CRIPPS: Yes. Now, as regards the word "previous," I ask your Lordship's attention to this point.

The CHAIRMAN: That is another matter, because the word "previous" may have reference to the very thing I spoke of—viz., the alteration in the conditions of the Company, and so on.

Lord SHAND: It is a previous dividend which shall have fallen short "of the said yearly rate;" and the yearly rate only comes into existence when the amalgamation takes place.

Mr. CRIPPS said he was going to deal with this point; but as far as he had gone, the 10 per cent. was only part of arithmetical machinery.

Lord SHAND: How far do you propose to go back?

Mr. CRIPPS said to the origin of the Company—1809. His point was that the words "any previous dividend" were used in the ordinary sense, and went back to the origin of the Company. In other words, it made no difference whether they started for the first time with the Water-Works Clauses Act incorporated, or whether it was incorporated at a subsequent date. In either case the limitation of profit was the same.

Lord SHAND: It would carry you back 90 years, would it not?

Mr. CRIPPS: I am not shrinking from the question; but it is not going back in the sense of back-dividends, it is merely a mathematical calculation.

The CHAIRMAN: If it is applicable to the shares and not to the individual, why not back to 1809?

Mr. CRIPPS: I cannot say; and I do not shrink from it.

Proceeding, the learned Counsel said that, taking the words in the ordinary sense, "previous dividend" would go back to the origin of the Company. The intention of the Act of 1864 was to put the whole undertaking under the terms of the Consolidation Act, just as though it had been incorporated in the earlier Acts. Then all that was done was to put all water companies in this country as nearly as possible on the same footing. This was not a case like an ordinary amalgamation. It was only a matter of the Kent Company being kept going and the North Kent Company being absorbed into it. In a large number of amalgamation Acts, one got all the old Acts which applied to the amalgamated Companies repealed, and then provisions were inserted keeping their liabilities alive. In this way, one might get a new start with what was called the Amalgamated Company. This was not the case here. The Kent Company never was dissolved; the only Company which was dissolved was the North Kent Company, which was absorbed into the Kent Company.

The CHAIRMAN doubted if that were more than a mere verbal distinction. It might be that it was not dissolved by express language of the statute; but if legislation put something else into it, was it not a fresh Company?

Mr. CRIPPS gave an instance of a Railway Company having new lines or a new branch, and said he did not think that could be called a new Company.

The CHAIRMAN said that was simply an addition of something to an existing Company; but he was speaking of something being brought into the Company—something which involved its government and distribution.

Mr. CRIPPS referred his Lordship to section 49, which enacted that, except as expressly provided, nothing in the Act should prejudice or alter any of the rights, powers, and privileges of the Company.

The CHAIRMAN said "the Company" did not necessarily mean the Kent Company.

Mr. CRIPPS said "the Company" in the Act was the Kent Water

Works Company. This was expressly stated. Therefore, the Company was not distinct from the old Kent Company, but was the same; but the North Kent Company was absorbed.

Mr. CRIPPS proceeded to deal with the remaining sections, from 76 onwards.

Lord SHAND, interposing, said that what was now proposed was to go back to 1809, when there was no dividend at all, and ask for 10 per cent. upon it. There was no dividend in 1810 or 1811.

The CHAIRMAN: Nor in 1827 and 1828.

Mr. CRIPPS pointed out that it was a very common thing in the early days of Water Companies that they did not pay dividends; there was a very large initial outlay.

Lord SHAND: You do not ask interest on these dividends?

Mr. CRIPPS: If the Act gave us interest, of course, we should ask for it.

Mr. CRIPPS, continuing his argument, contended that the underlying principle was that the Company should be in the same position when it incorporated the Water-Works Clauses Act in the course of its life as if it incorporated it at the commencement. It seemed to be a perfectly sound contention, and what he thought the Act provided. Counsel then read, and commented upon, the judgments delivered by Mr. Justice Joyce, and the Court of Appeal. He thought that the arguments for the Kent Company had not been properly appreciated. Turning to the two points of construction upon which the judgments rested, he said that one point which had to be considered was whether the Company really started in 1864—whether back history was wiped out, or not. The answer to this was to be found in the statute of 1864 itself. What was found there was that "the Company" in 1864 was the Kent Company; and the only difference was that it had absorbed the North Kent Water-Works Company's district. The words were: "The Company of Proprietors of the Kent Water-Works, in this Act called 'the Company.'" What it meant was that the whole of the Company was under the terms of the Act of 1847 from the date of the passing of the Act. The other question of construction was as to section 75. There was in this section a definition of the limitation of the profits of the undertaking. The last words were, "unless a larger dividend be at any time necessary to make up the deficiency of any previous year." Taking the illustration of the £100,000, on which £9000 had been paid up in one year, and on which £11,000 could be paid the following year if the profits allowed it, he asked why any line should be drawn at 1864.

Lord SHAND: In 1864 only you get a prescribed rate.

Mr. CRIPPS: You are told for the first time how to arrive at a limitation of possible profit. Of course, there was no such thing before the Water-Works Clauses Act. Having ascertained mathematically what the figure is, you may take advantage of it. The learned Counsel concluded by asking the Court to declare that his reading of the section was correct.

Mr. HALDANE followed on the same side. He maintained that the Court of Appeal had been misled by the incorrect use of certain phrases—among them "retrospective action." There was no question of retrospective action if he were right.

The CHAIRMAN said it was a question of what was meant by retrospective action. He thought that it was retrospective action if it were claimed that a dividend falling short of 10 per cent. in 1810 could be made up in 1890.

Mr. HALDANE pointed out that the profits to be divided were not to exceed 10 per cent. unless—and this was the exception—a larger dividend (that was, a large amount to be distributed) was necessary at any time to make up the deficiency of any previous dividend which had fallen short of the said yearly rate. This was a measure of future dividend with a rule which was to limit that future dividend, subject to an exception, which was to be measured by looking over the history of the Company for what had fallen short of the said yearly rate. "Any previous dividend" simply went to the measure which was to limit the amount by which one might exceed the 10 per cent. in the case of future dividends. It was literally retrospective; but one did not undo what was done in the past.

The CHAIRMAN: I think you do. There has been a declared dividend, and you undo that declaration of dividend by adding something to it.

Mr. HALDANE, with submission, questioned whether that was so.

In the course of the learned Counsel's further argument,

The CHAIRMAN said what was contemplated by the Act was that the dividend should be distributed out of the profits for the year; but the Company were not bound to distribute the whole of such profits. They might keep back something for contingencies.

Mr. HALDANE, in conclusion, submitted that the Act referred to previous dividends before 1864, which could be made up to the 10 per cent.

At the conclusion of the learned Counsel's address,

The CHAIRMAN, after a moment's whispered consultation with his colleagues, said they need not call upon Mr. Moulton. He then delivered judgment as follows: It appears to me that this question may be treated very shortly. It depends upon one section; and I think it exhibits the ingenuity of the learned Counsel that a matter depending upon such a small point could be protracted through three Courts, and argued with the ability and pertinacity that this has been argued. For my own part, it seems to me to be absolutely clear, without the shadow of a doubt. The Act which imposed for the first time a limit on the amount of the dividend that might be distributed among the shareholders contained a provision also that, if the dividend which was to be the limit for the future had not been arrived at, then, in distributing the future profits of the Company, that which had fallen short of the prescribed amount, which for the first time was then imposed, might be made up if the Company had made profits sufficient to supply them. It appears to me that the whole thing is very intelligible; and if it is the true view which both Courts have arrived at, it is very simple. If it bore the gloss which has been put upon it by the learned Counsel who argued for the appeal, I think it would be extremely difficult to reconcile the language with any intelligible meaning, because what has to be made up under section 75 is a deficiency. A deficiency of what? There is no deficiency at all in any of the years previous to 1864. You only get a deficiency by bringing in the limit prescribed for the first time in 1864. It is an impossible hypothesis. You cannot get a deficiency. There is nothing from which there can be a deficiency unless you import that limitation to what comes to the 10 per cent. If this is the only thing that is to be made up, the deficiency can only arise after 1864; and it appears to me, by the plainest rule of construction, that you cannot get behind that which for the first time imposed a limit from which the deficiency is to be made up. Under these circumstances, it appears to me abundantly plain. I can entertain no doubt whatever of what the meaning of the section is; and I move your Lordships that this appeal be dismissed.

Lord MACNAGHTEN: I am of the same opinion. The question of adjusting dividends under the statutory provisions does not go further back than when the Act of 1864 came into operation. The Kent Water-Works Company made a fresh start then, with fresh limitations and under new conditions. Before that time, there was no prescribed rate of dividend; nor could there be any deficiency within the meaning of the Water-Works Clauses Act.

Lord SHAND: I am of the same opinion. I have nothing to add except that I am not surprised that Mr. Justice Joyce called upon no argument from Mr. Younger for the respondents, and stated in the case that he did not feel any doubt about it. I agree with his judgment, and that of the unanimous judgment of the Court of Appeal, and in the opinion which your Lordships have delivered.

Lord DAVEY: There can be no doubt about this case; and I am quite satisfied with the reasons which have been given by Mr. Justice Joyce and the learned Judges of the Court of Appeal.

Lord ROBERTSON and Lord LINDLEY also agreed.

The appeal was accordingly dismissed, with costs.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Tuesday, Dec. 15.

(*Before Lords Justices* VAUGHAN WILLIAMS, ROMER, *and* STIRLING.)

In re The Welsbach Incandescent Gas-Light Company, Limited and Reduced, and the Companies Acts, 1867 and 1877.

This was an appeal by the United States Debenture Corporation, Limited, against the order of Mr. Justice Buckley, confirming a resolution for the reduction of the capital of the Welsbach Company by the sum of £2,135,562, on the ground that this amount had been lost or was unrepresented by available assets.*

Mr. YOUNGER, K.C., and Mr. KIRBY appeared for the appellants; Mr. EVE, K.C., and Mr. MARTELLI represented the respondents.

Mr. YOUNGER said this was an appeal from an order of Mr. Justice Buckley sanctioning a scheme for the reduction and reorganization of the capital of the Welsbach Company. The scheme was opposed by the appellants, who were the holders of £36,000 worth of preference stock; and they resembled a large body of dissentient preference shareholders holding stock to the amount of a quarter-of-a-million—substantially about one-sixth of the preference stock issued. Their view was that the scheme amounted practically, or partially, to a confiscation of their interests as preference shareholders; and they were opposed to it on the ground that it was unfair and inequitable to them. They further objected that the alleged loss of capital had not been proved. Mr. Justice Buckley based his decision on the fact that the loss had been proved, though he arrived at this conclusion by attributing a greater loss in certain items than even the petitioners themselves alleged. With regard to the second point, he decided that the scheme was in accordance with the strict legal rights of the parties; and, this being so, it was not so manifestly unjust as to induce the Court to withhold its sanction. On this point, the appeal raised a question of the highest general importance—namely, whether a power contained in the Memorandum of Association to make an alteration in rights conferred by it, had any effect at all. The facts were very complicated; but he would endeavour to deal only with those which were material. The learned Counsel then gave a history of the Company from its incorporation in 1897, when it combined four undertakings—one in England, one in Ireland, and two in Austria. Its capital was £3,500,000, divided into 300,000 5 per cent. preference shares of £5 (subsequently converted into £1,500,000 preference stock), 1,350,000 cumulative ordinary shares of £1 each (subsequently converted into the same amount of stock), and 650,000 deferred shares of £1 each (of which 629,539 were issued, and were not converted into stock). The whole question revolved round the rights of these different classes of shares, as set out in the Memorandum of Association. Paragraph 6 defined the respective rights; but there was a clause specifying that the rights for the time being attached to the various classes of shares respectively might be modified or dealt with in the manner mentioned in clause 52 of the Articles of Association, but not otherwise. This clause and two others in the Articles were to be deemed to be incorporated with the Memorandum. The effect was that the preferred shares were preferred over all the others both as to dividend and capital; then came the ordinary shares; and last of all the deferred shares.

Lord Justice VAUGHAN WILLIAMS: Your complaint is, on behalf of the preferred shareholders, that Mr. Justice Buckley has allowed a scheme in which the last are put in a wrong relation to the first?

Mr. YOUNGER said that was so.

Lord Justice VAUGHAN WILLIAMS: Supposing the loss of capital is proved, and supposing we think you are wrong in your contention as to the legal impossibility of altering the rights conferred by the Memorandum, your appeal fails altogether?

Mr. YOUNGER dissented. He said he should still contend that, under the circumstances of this case, the method by which the reduction was

* See "JOURNAL," Vol. LXXXIII., p. 377.

distributed over the different classes of shares was unfair and inequitable—so much so that the Court ought not to sanction it.

Lord Justice VAUGHAN WILLIAMS suggested that the legal point should be dealt with in the first place.

Mr. YOUNGER said this was what he proposed doing. It was always difficult and troublesome to argue a case on the question of loss of capital, so he would, in the first place, assume that the loss had been proved, and contend that the scheme was *ultra vires*. But he must first go through the facts briefly. The Company acquired the four businesses at the price of £3,258,124; and they had yielded the previous year a profit of £209,808. The undertaking was not at first prosperous, and for the year 1902 there was an actual loss on the English business of £23,628, though, on the whole, there was a profit, by reason of considerable dividends being received on shares held in the Austrian Company. About this time, or rather in 1901, a Committee of Investigation was appointed, who issued a lengthy report; and out of the recommendations therein contained the present scheme ultimately took shape. After reading various passages from the report and the summary—which concluded by expressing the belief that by reducing the capital, and pursuing a more enlightened and vigorous policy from a commercial point of view, and not relying on the monopoly conferred by patents and spending so much in litigation, the Company would have a prosperous future—Counsel said the result was that the then Board resigned, and the present Directors took their place. Since that time the record had been one of continuous progress and improvement. The loss of £23,000 odd on the English business was converted in the very first year into a profit of £45,858; and the sales of mantles had gone on increasing continuously. A profit was made in each succeeding year; but at the time the scheme was printed there were arrears of dividends on the preference shares to the amount of £225,000. The Company, however, had standing to the credit of the profit and loss account, and actually invested in securities, £129,771. In this state of things, the scheme was put forward; the loss of capital alleged being £2,134,539. The scheme was set out in the circular convening the meetings; and it proposed that the capital be reduced to £1,345,000, divided into 1520 preference shares of 13s. each, 1,350,000 ordinary shares of 5s. each, and 650,000 deferred shares of 1s. each—7s. being written off each preference, 15s. off each ordinary, and 19s. off each deferred share. There was also an alteration to be made in the Articles of Association. The ultimate effect was that the reduced preference shares were to be consolidated into stock, part of which was to be preference and part ordinary, in the proportion of 40 to 25, and the whole of the arrears of dividend were wiped out. There were in future to be only two classes of stock—preference and ordinary—the holders of deferred stock getting ordinary stock to the amount of 1s. in the pound on their present holding. According to this scheme, the loss alleged, which, if it were borne according to the rights of the shareholders as defined in the Memorandum of Association, would only fall on the preference shares to a fractional amount, was thrown upon them to the extent of 7s. per share; and they also lost their preference in the proportion of 25 to 40, and the whole of the arrears. However, the resolutions were ultimately carried, although at the first attempt a quorum was not present, and a second meeting had to be called, in the notice for which the shareholders were told that unless the resolutions were passed no dividends could be paid until the loss had been made good. This, no doubt, induced the shareholders to give their assent; but, in his view, the statement was made under a misapprehension of the law, as it was well settled now that, if profits were made on the year's trading, a dividend might be paid, although there might be a great loss of capital. The resolutions having been carried, the petition was presented. His submission was that it was not competent for a company, by inserting in their Memorandum of Association a power to do so, to alter any condition contained therein. If and so far as such clause purported to authorize the Company to extend or abridge their powers or objects, it would hardly be disputed that it would be absolutely invalid; and he should contend, on the authorities, that it was equally invalid when it referred to the rights attaching to various classes of shares, either as to dividend or capital. Counsel quoted several cases in support of his argument that the scheme was an interference with the rights of the preference shareholder. He then went on to argue the further point, that such interference was not necessary, as in the case of Allsopp and Co., in the general interests of the Company. This was a mere juggle for manipulating stocks, the effect of which was to take away from the preferred stock a large proportion of its preference, and hand it over to the ordinary stock. There were arrears of dividend due to the preference shareholders to the amount of £225,000; and there was in the hands of the Company, available for dividend, £129,000. But the preference shareholders were to be deprived of all their arrears, and of their right to participate in the £129,000, except to a very limited extent. It was also hard on the preference shareholders that the particular moment should have been chosen for putting forward the scheme, which was based on the assumption that the low-water mark of the Company's position was the normal condition of affairs. It was clear, however, on the evidence, that the low-water mark was reached by pursuing a policy which had been condemned and altered; and the result of the new policy had been to introduce a period of prosperity. Why should the preference shareholders lose the benefit of this, and be deprived of the advantages for which they had stipulated?

Lord Justice VAUGHAN WILLIAMS said he should like to get at the reason of this opposition. What was the proportion of the minority to the whole body of preference shareholders?

Mr. YOUNGER said about one-sixth, and there were some neutral. The preference stock entitled the holders in the aggregate to 252,762 votes; and there were 207,517 votes in favour of the resolution, and 40,947 against it.

Lord Justice VAUGHAN WILLIAMS asked why Mr. Younger supposed there was such a large majority in favour of a scheme which he said was so injurious to them.

Mr. YOUNGER replied that the reason was quite plain, because it was stated, both at the meeting and in the notice, that unless the scheme were passed the dividend on the preference shares would be indefinitely postponed.

Lord Justice STIRLING: Do you suggest that that is untrue?

Mr. YOUNGER submitted it was wrong in point of law. This was entirely a capital loss. There was no revenue loss, but a good profit; and there was no reason why a dividend should not be paid. If there were any doubt about it, a friendly action could be brought to have the question decided. That, no doubt, was the bait held out to the preference shareholders. There was no necessity for the scheme; and he should much prefer no scheme at all to the present one.

Lord Justice VAUGHAN WILLIAMS: Is it generally untrue to say that, if you have a heavy loss on capital—in a case where there really should be a reduction of capital by reason of obvious losses—it is not always for the good of the Company and its future progress that the loss shall really be borne by the class of shareholders who have the least advantages?

Mr. YOUNGER: I quite agree.

Lord Justice VAUGHAN WILLIAMS: That is a reason, therefore, for throwing on the preference shareholders something more than their proportion of the burden.

Mr. YOUNGER agreed that such a case might arise. He said he should be the last to suggest that schemes of reduction which were not in accordance with strict rights might not, in some cases, be better and even fairer than those which were.

Lord Justice VAUGHAN WILLIAMS said his experience was that where companies came in for troublous times, and sustained serious losses, schemes were generally prepared on a sort of *noblesse oblige* basis, in which the preference shareholders had to bear the greatest part of the burden.

Mr. YOUNGER submitted that this was a wrong principle. In many cases the holders of preference shares were trustees—people who were content with a small dividend, so long as it was secure. These particular appellants held enormous stocks of shares in different companies; and they felt that if this scheme were sanctioned, the holding of preference shares would become much more hazardous than it had hitherto been considered. He submitted that the learned Judge had taken a wrong view, in so far as he seemed to have held that the scheme was strictly in accordance with the rights of the various parties, and that it had not been shown to be inequitable. He (Counsel) submitted, on the contrary, that it was not in accordance with the rights of the parties, which were strictly defined by the Memorandum of Association; and though he admitted that this was not conclusive—it being still in the discretion of the Court to sanction it—still it threw upon the Company the onus of showing that the scheme was fair and equitable. He continued that no such evidence had been adduced. Having read the judgment of Mr. Justice Buckley,

Lord Justice STIRLING asked whether it was argued in the Court below that the proposed scheme was *ultra vires*.

Mr. YOUNGER said it was not. The learned Judge decided it solely as if it were a question of strict legal rights. It was for the Court to consider all the circumstances of the case; but he submitted that there was no such fairness in the scheme as to entitle the Company to say that it ought to be confirmed. The amount of loss had not been proved. But he preferred to rest his case upon the other point.

Lord Justice VAUGHAN WILLIAMS said he could not understand how, in view of the facts which had been brought before them, it could have been necessary or expedient or desirable in the interests of anyone to make so large an alteration in the rights of preference shareholders.

Mr. EVE said the real explanation was that the Company having carried on their business under disastrous circumstances for many years, determined, if they could, to rid themselves of the then existing management, and to consider how it was possible to restore the Company to prosperity. A Committee was appointed; and, after considerable negotiation, it was found that the only adhesion on which the ordinary and preference shareholders could be brought about was by making this reduction. The Committee's view that the old Board had brought the Company to a state of financial disaster, was affirmed by the shareholders at large. In the absence of *mala fides*, this was a bargain which it might be thought was too liberal a concession on the part of the preference shareholders.

Lord Justice VAUGHAN WILLIAMS: That is what I want to know. Why should it be done?

Mr. EVE said the answer was that they agreed to do it, considering it to be a fair arrangement. He had no doubt the preference shareholders were alive to the concession that they were making; and in the absence of any suggestion that the majority had acted *mala fide*, the Court would not draw the inference that they were so blind to their interests that they had given away more than they intended. Having drawn attention to some of the details of the scheme, and the power conferred by the Articles to make the reduction,

Their LORDSHIPS said they were not prepared to disagree with the view expressed in the Court below as to the fairness of the scheme; and therefore they would hear appellants' Counsel on the question that the loss of capital had not been proved.

Mr. YOUNGER submitted that the basis upon which the Company purported to prove the loss was based upon this—that the state of things at the close of the financial year 1903 was permanent, and not improving, and the low-water mark was to be its permanent position. In the Court below, the Judge said that, if the loss was temporary, the Court would not regard it as a loss to be considered in a case of reduction. Further, the loss depended entirely upon the correctness of the estimate made by the Company of the value of the shares which they held in the Austrian Incandescent Gas Company, upon the value which they placed on their patents, and upon the goodwill. At some length, he attempted to show that the value in each case was too low, and that there was no justification for fixing the figure which the Directors had placed upon the goodwill and the shares.

Wednesday, Dec. 16.

Mr. KIRBY having added a few words in support of the appellants' case,

Lord Justice VAUGHAN WILLIAMS said that, in his judgment, the appeal failed. He did not know that there was much to be said, except that he entirely agreed with the judgment of Mr. Justice Buckley and

the reasons that he gave in support of it. There were really only two points for consideration—the first being proof of the loss. If one went through the figures and dealt with them as Mr. Justice Buckley had done, there could not be any doubt that the loss had been proved. As to the shares in the Austrian Incandescent Gas Company, he could not help thinking that when the margin and the difference between buyers' and sellers' price were considered, and the shares put at the mean of 125, the value was placed rather too high than too low. Assuming the loss to be proved, there was very little else to say. If one had a case in which the Memorandum gave to a class of shareholders certain privileges and rights unconditionally, then he agreed to the full that the case of *Ashbury v. Watson* was conclusive to show that one could not alter or modify the privileges so unconditionally given by the Memorandum of Association. But this was not the case. So far from the privileges being given unconditionally, it was perfectly obvious they were given conditionally. Clause (*f*) of article 6 provided that the rights for the time being attaching to the several classes of shares respectively should be modified or dealt with as provided in clause 52, and not otherwise; and that this clause and clauses 157 and 159 should be deemed to be incorporated therein, and have effect accordingly. He thought the proper steps had been taken to bring about the rights and privileges of the preference shareholders; and, under these circumstances, he saw no reason why the sanction of the Court should be refused to it. The only other question was whether the scheme was an unfair one. He entirely agreed with Mr. Justice Buckley that, whether a scheme accorded or not exactly with the rights of the shareholders, one might always consider whether the scheme was a fair or unfair one. In his judgment, the scheme was a fair one; and the majorities in its favour went far to show, at all events, that the shareholders—and in particular the preference shareholders—regarded it as fair,

Lord Justice ROMER said the only point in the case was that argued on behalf of the appellants, that the provision in clause (*f*) of article 6 of the Memorandum was invalid; but in his opinion the provision was a perfectly good one. The rights and privileges of the different classes of shares *inter se* constituted a matter not specially provided for by the Legislature. There was no reason why these rights and privileges should not be altered from time to time, or why such alteration should not be duly provided for. The question was not like one concerning the objects of the Company or the total amount of the capital; for these matters, as specified by the Act of 1862, must be indicated in the Memorandum, and could not be changed at the will of the Company. It was said, on behalf of the appellants, that the rights and privileges of the preference shares were fixed by the provisions contained in the Memorandum of Association, clause 6, divisions (*a*) to (*d*) inclusive, and that these clauses constituted a condition which could not be altered. But the answer to this argument was perfectly clear. The condition as to the rights and privileges of the preference and ordinary shares contained in the Memorandum was not that limited by the subdivisions (*a*) to (*d*), but was that provided for by subdivisions (*a*) to (*d*) *plus* that contained in (*f*). He had no doubt whatever that the provision in clause (*f*) was perfectly valid; and, this being so, the whole argument on behalf of the appellants substantially went by the board.

Lord Justice STIRLING was of the same opinion, and for the same reasons. The only point which struck one with regard to the fairness of the arrangement was that it did at first sight seem as if the rights of the preference shareholders had been somewhat seriously trenched upon; but when it was remembered that the alteration in the rights of the various classes had been considered by a Committee consisting of business men chosen by the shareholders themselves, and that the alteration had been sanctioned by large majorities at the various meetings which had been held, it would require a very strong case to induce the Court to interfere. He quite agreed that, in all these cases, the Court were not under an obligation to confirm any scheme, by whatever majority it had been sanctioned; but they were bound to exercise a discretion in a proper case—though when they found that the determination of the question as to the rights attaching to different classes of shares had been left to be decided by the shareholders themselves, the Court ought to be very careful not to interfere with the *bonâ fide* judgment of business men.

The appeal was dismissed with costs.

The following statement in regard to the case has since been sent out by the Welsbach Company: "Following upon the decision of the Court of Appeal on Wednesday last, Messrs. Ashurst, Morris, Crisp, and Co., the Solicitors for the United States Debenture Corporation, Limited, who opposed the scheme for the reduction of the capital of the Welsbach Incandescent Gaslight Company, Limited, have notified the Welsbach Company's Solicitors that, as the Courts have not endorsed their views, the Corporation do not propose to carry the matter further. The result will be that the litigation is at an end; and the Directors are now in a position to give effect in due course to the scheme approved by the shareholders."

Colliery Workings and Damage to Gas-Mains.

In the Chancery Division of the High Court of Justice on Thursday, before Mr. Justice Joyce, Mr. Younger, K.C., applied for an injunction to restrain the Mill Farm Colliery Company, Limited, from working their colliery within a certain distance of their boundary, as it was endangering the gas-mains of the West Bromwich Corporation, for whom he appeared. Mr. Hughes, K.C., for the defendants, said he thought the matter might be disposed of for the present without occupying further time. Though he did not admit that any damage had been done, he was prepared to submit to an injunction on the usual terms as to working within a limit which the plaintiffs themselves laid down in their evidence, of 55 yards from the road in question. Mr. Younger said he should prefer an injunction against working so as to cause subsidence. Justice Joyce said there had been a good deal of discussion about such a form of injunction, and he did not think it was quite fair. After some conversation, it was arranged that the injunction should be as offered, within 55 yards; Mr. Hughes intimating that his clients would probably claim damages from the plaintiffs for interfering with their working, and Mr. Younger replying that the damages would have to be strictly proved. Also that, with the consent and in the presence of the plaintiffs, certain experimental work might be done within the prescribed limit, with the view of ascertaining the real facts, with liberty to apply if the plaintiffs refused their consent. On these terms the motion stood over.

The Household Gas Heater and Cooker Company, Limited.

At the Board of Trade Offices, Carey Street, on Wednesday, Mr. H. M. Winearls, the Assistant Official Receiver, presided at the meeting of the creditors and contributories of the above-named Company, which is in compulsory liquidation. The liabilities to creditors were returned at £5402, of which £2727 was expected to rank; and the assets were covered by claims on debentures. The total deficiency as regarded shareholders was estimated at £46,487. It was stated that a Receiver on behalf of debenture holders was appointed in September last, and that the failure of the Company appeared to be due to mismanagement. The Company, which was formed with a capital of £50,000 to acquire an invention for improvements relating to burners and the letters patent in connection therewith, except for Germany, Belgium, and the United States, had carried on business under its present name since November, 1902, and previously from April, 1902, as the Household Gas Stove Parent Company, Limited. The creditors and contributories resolved to leave the liquidation in the hands of the Official Receiver.

The Commercial Gas Company Fined.

At the Worship Street Police Court on the 3rd inst., the Commercial Gas Company were fined £5 and 23s. costs for having supplied gas containing an excess of sulphur, at their testing-place at Wellclose Square, as far back as April 29 last.

A Case of Trespass.

At the Hull County Court, on the 11th inst., before his Honour Judge Raikes, K.C., and a Jury, Messrs. Major and Co., Limited, tar distillers and chemical manufacturers, of Sculcoates, sued Francis W. Hunt for damages for trespass upon their premises. Dr. Aske, who appeared for the plaintiffs, said that though no actual damage was caused by the trespass, yet it was very serious, inasmuch as it involved conduct on the part of the defendant derogatory to ordinary fairness and honesty among respectable business men. Hunt was in the employ of Messrs. Major for fifteen years; and when he left in January last, Messrs. Major gave him a present of £25. Since that time, Hunt has been carrying on business as a chemical manufacturer. In October last, however, he communicated to a friend that Mr. Ashford and Mr. Ellison, jun., of the firm of Messrs. Ellison and Mitchell, who were competitive manufacturers with Messrs. Major, were coming over to see Messrs. Major's works after office hours; and he thought it was "a devil of a cheek." In consequence of this, information was given to Messrs. Major, whose Works Manager, Mr. Mann, remained on the premises on Hull Fair Saturday. After office hours, and when no one would be expected to be on the place, he saw Hunt go sneaking along, and spying into the office windows. Mann tackled him, and Hunt said he had come to see Crawforth (a workman), as he had called and found him not at home. This was not true. Hunt also made various other excuses. Mann followed Hunt to the gate, as he was leaving, and saw two men standing outside, who were afterwards ascertained to be Ashford and Ellison. Dr. Aske explained that Messrs. Major employed chemists for research work, and had been at great expense in new plant and in adapting it to the latest and most up-to-date processes of manufacture; and they had recently brought out several lines of specialities. It would be most serious if people could go to manufacturers' premises and ascertain their business methods. Messrs. Major would have been willing not to press the matter if Hunt would have apologized and given a proper statement of the reasons why they were going round the works, and what they intended to do. No satisfactory explanation had been given; and consequently, Messrs. Major had not accepted the £5 paid into court. Evidence was then called which bore out Dr. Aske's statements. Mr. Pearlman, who appeared for the defendant, called Hunt, who stated that he was not interested in the processes, and merely went round as Ashford and Ellison wished to see over the works. In cross-examination, witness said that he knew it was after office hours; but Ashford had only arrived late. He did not think it was an honourable thing to do; and he had apologized to Mr. Major. Mr. Ashford said he had simply come over to please Mr. Ellison, jun. He was only actuated by idle curiosity, and did not wish to see Messrs. Major's methods. In cross-examination, witness admitted he knew Messrs. Major had developed some new processes, and that he was ashamed of having been a party to the scheme. His Honour said it was a question for the Jury whether the defendant had gone on the premises from mere idle curiosity or to get information as to Messrs. Major's processes. Ashford had admitted that Messrs. Major's permission was not asked, because it would not have been given. Damages could be given if there had been a moral injury committed to the plaintiff. After consultation, the foreman announced that the Jury considered the object was to obtain information on matters of business, and awarded the plaintiffs £25.

Private Bills for Next Session.—Under the amended Standing Orders, the time expired last Thursday night for depositing in the Private Bill Offices of both Houses of Parliament copies of Private Bills to be promoted in the ensuing session. When the offices were closed, it was announced that the number of Bills so lodged was 191, compared with 218 deposited last session.

MISCELLANEOUS NEWS.

READING TO BE ENTIRELY LIGHTED BY INCANDESCENT GAS-LAMPS.

Electric Arc Lighting Beaten on all Points.

At the Meeting of the Reading Town Council last Tuesday, the Sub-Committee—consisting of Alderman J. W. Martin, Alderman C. G. Field, Mr. F. B. Parfitt, and Mr. J. Hopkins Walters—who were appointed to consider the question of the future lighting of the borough, owing to the expiration of the contract with the Gas Company, presented the following report:—

The Sub-Committee beg to report to the Council that they have very carefully considered, at four separate meetings, the subjects referred to in the resolution appointing them, and, in connection therewith, the schemes or tenders delivered by the Reading Gas Company and the Reading Electric Supply Company respectively, and communications received from both Companies on the subject.

The Sub-Committee have also conferred with representatives of each Company separately, and have had regard to the installations set up by each Company for comparing the illuminating effect of the systems of lighting proposed by them respectively, and have come to the conclusion to recommend to the Council that arrangements should be made with the Reading Gas Company for lighting the whole of the borough by means of incandescent gas, and that the basis of such arrangements should be generally in accordance with the Company's scheme or tender No. 2, which was submitted to a Committee of the Whole Council on the 11th of September last—subject, however, to such special provisions in favour of the Corporation contained in the Company's Acts of Parliament as it may be deemed expedient in the interests of the Corporation to require the Company to comply with.

The Sub-Committee also recommend that they may be empowered to arrange with the Gas Company the details of the new contract for the approval of the Council, and for the Company to continue the lighting, extinguishing, cleaning, and repairing the public lamps after the 31st inst., under the terms of the present contract, until a new contract has been settled and executed.

Mr. MILSOM pointed out that no reference was made in the report to the electric light being used on the tramway route; and he asked why this was so.

Alderman FIELD said that no mention was made of it simply because, after consideration, the Sub-Committee were unanimously of opinion that they could not avail themselves of the services of the Electric Lighting Company. Many points were involved in addition to that of the price. Answering further questions, he said the adoption of either electric light or gas would involve tearing up the roads. He did not say that the whole of the tramway track would have to be taken up; but the Sub-Committee understood from the Electric Company that the probability was they would not use the conduits already laid. Even if they did, it would involve taking up part of the track. Proceeding to move the adoption of the report, he said that each member of the Sub-Committee approached the matter with the view, if possible, of arranging that some portion of the town should be lighted by electricity if they could see their way to do so. After full consideration, however, they were driven to the conclusion that there was no alternative but to go to the Gas Company and get light from them. It was considered that for lighting the streets gas was a suitable illuminant, and probably some of the Sub-Committee went so far as to think that it was a far better light than that given by electricity. He confessed that, although he had never been in favour of lighting so large a part of the town as had been suggested with electricity, he should very much like to have seen some portion of the town lighted by electric lamps for comparison. A great advantage could be claimed for gas in regard to lighting the tramway routes. For every single electric lamp proposed in the scheme laid before the Council, there would be four gas-lamps. They all knew the uncertainty attaching to the electric light; and if it happened that the light on one of the centre poles on the tramway routes failed, there would be three poles in the road absolutely unlighted. But if three gas-lamps went out, there would still be one left alight. As to the question of cost, according to the figures put before the Council, gas would cost £1200 per annum less than the electric light. Besides this, it was pointed out, on behalf of the Gas Company, that if the Council cut out the central part of their system—the part which was cheapest to provide light for, they must not ask the Company to light the rest of the town at the same proportionate rate as that which would be charged if they lighted the whole borough. Therefore, if the Council decided to light the centre of the town or the tramway route by electricity, and the rest of the town by gas, they would be cast in a very much larger expense than the £1200. The Council, he had no doubt, would get a little better terms from the Gas Company than had been quoted for the erection of the lamps. Under scheme No. 2, which it was proposed to adopt, there would be triplex incandescent gas-lamps, 40 yards apart, on each side of Broad Street; and there was no question but that a magnificent light would be produced. Reading would then be lighted equally as good as, if not better than, any town in the kingdom. When the Committee concluded their labours, and came to the question of the contract, he hoped they would successfully insist in getting a stipulation put into it to the effect that, if the Corporation decided to use any other illuminant than gas for certain portions of the town, they would be at liberty to do so by giving a specified notice. The gas contract would be a yearly one; and alterations or improvements could be made in the service in very much less time than that. But with the electric light, the Council would have to bind themselves to the system definitely—whether any improvements were made or not—for a period of eleven years. His experience of street lighting went back a good many years; and the changes in lighting during that period had been so marked that he would hesitate very seriously before assenting to entering into a contract with any Company for such a term as eleven years. If this were done, they would find themselves at the end of that period in exactly the same position that they had been in during the last few months, and be again utterly ashamed of the lighting of their streets.

Alderman MARTIN, in seconding, expressed the belief that the electric light would be "the light of the future," but at present there were several things against it—chiefly its expense. The Sub-Committee had come to the conclusion that they would get a better light, at a cheaper rate, from the Gas Company than from the Electric Company. One thing that had struck him was the way some towns had discarded the electric light and gone in for incandescent gas-lamps. In parts of London the latter system was seen to great advantage. Another point in favour of gas was the better light it gave in a fog than electricity; and, Reading being a foggy town, this had to be considered. In the true interests of the town, and looking at the matter from the point of view of finance as well as efficiency—although they would have liked to divide the contract between the two Companies—he thought the Council would be wise to adopt the report.

The DEPUTY-MAYOR (Mr. A. H. Bull) said that in Liverpool members of the Council, some time since, saw incandescent gas-lamps being substituted for the electric light; and opposed as he was to gas, he must say that, in the best interests of the ratepayers, the Council would be well advised to agree to the recommendations.

Mr. PARFITT held that, under the proposed scheme, they would not only save money, but light the town far better than with a scheme partly electricity and partly gas.

Alderman HEELAS stated that the explanations given had thoroughly satisfied him.

Mr. JONES, while admitting that he was more partial to the electric light than gas, said the able manner in which Alderman Field had explained the matter to them had quite convinced him that incandescent gas lighting would be the better of the two systems.

Mr. KIMBERLEY having expressed somewhat similar views,

The recommendation of the Sub-Committee was unanimously adopted.

MANCHESTER CORPORATION GAS SUPPLY.

Proposed Increase of Gas Capital and Extension of Works.

At the Manchester Town Hall last Tuesday, Mr. H. P. BOULNOIS, M.Inst.C.E., one of the Inspectors of the Local Government Board, held an inquiry respecting an application by the Corporation for a Provisional Order to alter and amend existing legislation in connection with their gas undertaking.

Mr. T. HUDSON (Deputy Town Clerk) represented the Corporation; while Mr. C. F. BRIERLEY attended on behalf of the Manchester and Salford Property Owners' Association.

Mr. HUDSON, at the outset, explained that the application was not really one to authorize the Corporation to borrow money forthwith, but merely to amend their Act of Parliament so as to enable them, with the sanction of the Local Government Board, to borrow moneys in the future. It would be necessary, whenever any actual expenditure was to take place, that the Corporation should apply again to the Board for power, and that full opportunity should be given for investigating the particular purpose for which the expenditure was to be incurred. The present limit of the borrowing powers of the Corporation for the purposes of the gas undertaking was £1,700,000, and it was proposed to increase this sum to £2,700,000. The necessity for the application arose from various causes. In the first place, the amount of £1,700,000 which the Corporation were authorized to apply for sanction to borrow under the existing Acts had already been exhausted. The first sum of £250,000, which was sanctioned by the Act of 1875 to be borrowed for 55 years, had been expended, and £100,000 of it had been repaid by means of a sinking fund. A second sum of £250,000, authorized by the Act of 1880 to be borrowed for 55 years, had also been spent, and £88,712 had been repaid. A third sum of £200,000, borrowed for 55 years, had been used, and £54,000 repaid. A further sum of £500,000, which was sanctioned by several instalments in 1894, 1896, and 1898 had been laid out on capital account, and £144,842 had been repaid. The last half million, sanctioned by the Act of 1899, had been authorized to be borrowed by instalments covering the whole sum; but only £299,700 had been actually expended, of which £28,499 had been repaid. Thus, of the total sum of £1,700,000 sanctioned, £1,499,700 had been borrowed and £416,053 had been paid off out of the sinking fund; leaving an outstanding debt in respect of that borrowing of £1,083,647. As to the amount which had not yet been raised, though sanctioned, the works were in progress, and the borrowing would take place at an early date. Another reason why the Corporation desired that their present borrowing powers should be increased was that the works which had been constructed were only barely sufficient to produce the necessary gas to meet the maximum daily demand, which had been greater than the present maximum producing power of the manufacturing plant. Then, again, the Corporation were engaged in making arrangements for the amalgamation of some of the out districts with the city. Settlements had been actually come to with four urban districts adjoining, and perhaps also a fifth would be included in the Bill; and in the course of next session these would probably become part of the city. Past experience had shown that whenever amalgamation took place it resulted in a large increase in the consumption of gas; for inevitably, when the price was reduced to the out-districts through their inclusion in the city, the consumption increased very largely in those districts. There was an additional reason which was always present—the increase in the number of houses and in the population which was constantly taking place. This in itself necessarily involved a great increase in the consumption of gas. The amount of the loans already sanctioned for capital purposes would be sufficient to carry on the work of the Gas Department until the beginning of 1905. The additional £1,000,000 for which it was sought to obtain borrowing powers would, it was estimated, meet all requirements for ten years, beginning with the year named. The estimates included more manufacturing works

at the Bradford Road station, sufficient to enable the department to make an additional 10 million cubic feet of gas per day; and the estimated expenditure for this purpose was £431,800. Further works were required at the Gaythorn station, estimated to cost £43,200. The new distributing plant, meters, and stoves were also reckoned to involve a capital expenditure of £525,000 during the ten years. In this way, it was expected, the whole of the £1,000,000 would be expended during the ten years ending 1915.

Evidence was then called in support of the application.

Alderman *Gibson*, the Chairman of the Gas Committee, stated that the business of the Gas Department continued to grow alike in respect to lighting, heating, and power, and especially as regarded gas engines and stoves. The extended use of prepayment meters in small houses also accounted for increased consumption; the Corporation having over 40,000 of them in the city. The enlargement of the city boundaries, with the consequent reduction of 3d. in the price of gas in the districts that were to be amalgamated, was certain to greatly increase the consumption of gas. Past experience showed that the immediate loss of income caused by the reduction in price would be made up within three years at the outside. The present productive power of the works was only about equal to the actual requirements, and extensions would be absolutely necessary if the Gas Committee were to cope with the increased and increasing demand for gas. The department did not involve any charge on the rates—being, in fact, most remunerative. In the past, it had provided the ratepayers with an annual sum in relief of the rates averaging £50,000; and in the present year, rather than allow the rates to be increased, the Committee had promised to contribute £70,000. He did not think their ability to continue these payments in the future would be in any way diminished.

In reply to Mr. BRIERLEY, witness said the Committee considered that it was absolutely necessary to apply for the Provisional Order at the present time. It was important that, in the case of such a great and growing undertaking, they should look considerably ahead.

Alderman *Briggs*, the Deputy-Chairman of the Gas Committee, said no portions of the works were at present obsolete, and so none of the money would be required to make good existing plant.

Mr. *J. Gibson Newbigging*, the Chief Engineer of the Gas Department, spoke to the present condition of the works and the proposed extensions. He said the gas-producing capacity of the plant, when the additions already authorized had been completed, would be 26 million cubic feet per 24 hours; and the storage capacity would be 24½ million cubic feet. This latter was rather too low; it ought to be equal to the producing capacity. The greatest consumption in any 24 hours so far had been 26,164,000 cubic feet; and the works, therefore, were only just of sufficient capacity to meet the maximum demand, without any margin for reserve power. He estimated that the maximum demand for gas in 1915 would be not less than 35 millions per day. Out of 141,954 consumers on the books on March 31 last, 12,803 possessed gas-cookers on hire. Since the Corporation decided six months ago to abolish the charge for these cookers, the number in use had increased to 15,000; and he thought there would be a further steady increase until the majority of the consumers would possess them. The prospective increased demand for gas in 1915 would require additional plant capable of producing 10 million cubic feet per day. It was proposed that the new works should be erected at the Bradford Road station, where there was already sufficient vacant land available. It was intended also to put up at the same works a gas-holder having a capacity of 8 million cubic feet. The total producing capacity of all the works would then be 37,400,000 cubic feet, and the storage capacity 32,500,000 cubic feet per day. In conclusion, witness gave the following summary of the expenditure of the £1,000,000 during the ten years from 1905 to 1915:—

New gas-works of a capacity of 10 million cubic feet per day	£431,800
Reconstruction of second half section of No. 2 retort-house, Gaythorn station	43,200
New mains	135,000
New service-pipes	80,000
New meters	160,000
New cooking stoves	150,000
Total	£1,000,000

Mr. *Charles Nickson*, the Superintendent of the Gas Department, supplied further statistical information. He said the total assets of the Gas Department were at present £2,683,897, and the liabilities £1,327,666. The excess of assets over liabilities was £1,356,231, as compared with £897,907 ten years ago. The number of consumers was 141,954, against 81,433 in 1893; and the consumption of gas was 4,617,387,000 cubic feet, compared with 3,474,276,000 feet in that year. The average increase per annum, notwithstanding the competition of electricity, had been at the rate of 3·29 per cent. during the ten years. Between 1893 and 1903 there had been paid in aid of the rates out of gas profits £506,321.

Mr. BRIERLEY intimated that he did not raise any objection to the granting of the Order, on the understanding that, whenever any of the money was required to be borrowed, an inquiry would be held at which the matter might be discussed.

Mr. J. HARTLEY, a ratepayer, made a speech in opposition to the application, on the ground that as little money as possible ought to be spent by the Corporation when times were bad. If municipal expenditure were not checked, he said, the debt of the country in this respect would soon be as large as the National Debt.

NOTTINGHAM CORPORATION GAS SUPPLY.

Increased Profits—A Lower Price for Gas.

At a recent Meeting of the Nottingham Corporation Gas Committee, the Sub-Committee who were appointed for the purpose presented a report giving an approximate estimate of the worth of the trading of the department for the six months ending Sept. 30.

The CHAIRMAN (Alderman Ford) remarked that it had not been customary to submit a quarterly estimate of the financial standing of the undertaking to the Gas Committee, for many obvious reasons; and the Committee would quite understand that a concern depending very largely on the chemical market, which fluctuates more rapidly than almost any other market known, could not give very reliable or accurate forecasts. This had always made him very careful indeed to avoid any statement as to the future, unless the necessary funds, &c., to cover any suggested alteration in price were already in hand. Otherwise a change in the market, such as was experienced in 1896, and again in 1900, might easily make impossible any proposed reduction in the price of gas. Their new Engineer and General Manager (Mr. J. H. Brown), however, found that it was impossible to satisfactorily control the large undertaking without having before him an accurate and reliable statement of each quarter's financial results, in order to at once ascertain the effect of his change of policy, and be able to cope with any leakage or decreased receipts or increased expenditure which might make itself apparent in any department. From the figures submitted, they would note that a very large profit indeed was shown; but it would be unwise to submit these figures without considerable explanation. It was to be remembered, too, that the statement was based on roughly-estimated figures. In regard to gas, the large increase in consumption of about 40 million cubic feet had approximately balanced the decrease in price charged of 2d. per 1000 cubic feet. This increase was for the two summer quarters, and was due entirely to the number of slot meters and cookers fitted during the summer months; and it was anticipated that this very large increase would not be continued during the coming winter months. Coke showed an increase of about £1800, which was due to a very satisfactory reduction in the amount used in carbonizing, and to a slight increase in price which occurred during the summer. Unfortunately, in sympathy with coal, coke had latterly shown signs of falling very considerably in price. Tar exhibited an increase of about £2000, in spite of a decrease in the market value of products. He was sorry to say that the market was slowly getting worse; and pitch, their chief product at present, had already fallen from 60s. to 48s. per ton at port, and there were indications of even lower figures being quoted. This falling off was almost entirely due to the reduction in the value of coal and the cessation of tramway work in England due to the dearness of money. Sulphate, chemicals, &c., showed an increase of £2800. Owing to better working of the plant, a larger production had been recorded, amounting in value to about £2100; and owing to better administration and adopting modern methods, and also to the use of the waste—a system introduced by Mr. Brown—their expenses of production had been £700 less. Here, again, market values had fallen considerably; and sulphate of ammonia was quoted £12 per ton, as against £13 a few months ago. This drop in value was largely due to the coke-oven recovery plants which were being very rapidly installed in Westphalia, and to the adoption, and proposed adoption, of Mond gas plants, with their ammonia recovery processes attached. Taken together, however, chemicals showed an increase of £4800; and this was in face of a fall in values of not less than 10 per cent. There was no doubt that, but for the efficient management of their plant by Mr. Brown, instead of a gain, a considerable reduction would have been shown. But however skilful a man might be, he could not hope to show increased profit in the face of falling markets; and the Committee must be prepared to expect smaller profits from this department in future. Dealing with the payments, he explained that coal showed a net saving of £5000, due very largely to an increased make of gas per ton. Roughly speaking, 75 per cent. of the increase of 44 million cubic feet in the consumption had been met by the increased make of gas per ton. About £300 extra had been spent in stacking coal; but this had been more than compensated for by the reduction in price. Wages showed an increase of £1600. Carbonizing had cost £850 more, owing to the Radford works being in operation through the summer months. Extra repairs to works, plant, machinery, &c., had cost roughly £1200 more; but, on the other hand, owing to an improved method of preparing the oxide, instituted by Mr. Brown at the chemical works, a saving of nearly £500 had been effected. The general payments showed a saving of £2000. Repairs to works were roughly £1000 more. Purification, on the other hand, owing to the saving in the manufacture of the chemical materials and alterations in the method of working, showed a gain of nearly £1600. The net result of the past six months' trading was an increase of £12,000. This extra profit was an abnormally large one. But, again, he felt called upon to remind them that for the six months ending September, 1902, the undertaking was not under the charge of any Engineer or Manager; and though the prices realized for all products, &c., were well up to full market values, the financial results were not very satisfactory, and in the second half of the year extremely good results were obtained by the new Engineer—in fact, better than they had ever known. To set against this increased profit, they had the amounts which had been expended or sanctioned by the Gas Committee. The reduction which had already taken place of 2d. per 1000 cubic feet represented a reduction in the receipts of £13,000. The De Brouwer machine and alterations sanctioned in connection therewith was estimated to cost £7500. The extension to the sidings at Basford and the new cyanogen plant would entail a further expenditure of £3000, the new purifiers recently completed £3300, the new meter and ammonia washers £3000, sulphate plant, saturator, &c., £3350, and disabled gas-holder at Eastcroft (to be written off capital account) £6000—making a total of £24,650. This expenditure was all absolutely necessary; and the greater portion had already been sanctioned by the Gas Committee. A further reduction of 2d. per 1000 cubic feet from the commencement of the March quarter would mean a reduction in receipts to the extent of £5000. This was the very utmost that the department could be expected to provide for during the current year. He would have been very glad to have brought forward a proposition to reduce the price of gas to automatic consumers; but their many commitments would not permit of this being considered during the present financial year. Taken as a whole, he thought the Committee had every reason to congratulate themselves on the satisfactory condition of the finances; and he had every reason to believe that the present financial year would be the most favourable known in the history of the undertaking since the purchase by the Corporation.

CONTINENTAL UNION GAS COMPANY.

A Reduced Dividend, and the Explanation.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, 7, Drapers' Gardens, Throgmorton Street, E.C.—Mr. ARTHUR LUCAS in the chair.

The SECRETARY (Mr. F. W. Himing) read the notice convening the meeting, the report of the Directors, and the statement of accounts. The report was as follows :—

The Directors have to report that at Messina and Montargis, the two stations owned by the Continental Union Gas Company, Limited, the increase in the number of consumers has been 5½ per cent. The total quantity of gas sold, however, shows a decrease, due to the large diminution in the quantity sold for public lighting on account of the adoption of the incandescent burners by the town of Messina for the whole of the 2400 street-lamps.

The net sum spent on capital account at these two stations during the year amounts to £1030, being for additional mains, lamps, and services. The net profits at these two stations show a decrease of £1998 due to an increase of wages, to less gas sold at Messina, and to the fall in the selling price of coke.

With regard to the Union des Gaz, the total debited by that Company to capital account for work completed during the year amounts to £210,790. This includes new batteries of horizontal retorts, with charging and drawing machinery and coke conveyors, &c., at Genoa; new batteries of inclined retorts and coke conveyors and elevators at Milan; a new gasholder at Roanne; and new mains, lamps, and services at the stations generally.

The average price of coal distilled shows a decrease of about 4d. per ton; but, on the other hand, the net price received for the coke sold shows a further heavy fall of 3s. 7d. per ton. Tar also shows a decrease of 2s. per ton.

There has been a net increase of 650 in the public lamps. The number of private consumers on the books of the Union des Gaz on the 30th of June last shows a further increase of 12,306, equal to about 8 per cent., making a total of 170,407 consumers supplied by that Company. The increase in the quantity of gas sold is about 7½ per cent.

The Union des Gaz have obtained concessions for lighting the Communes of Bougival and Marly-le-Roi, both situated in the Rueil district, near Paris.

In the early part of the year under review, a certain amount of unrest existed among the workmen at the Italian towns (including Messina) lit by both Companies. A very detailed set of rules, known by the name of an *organico*, has, however, been drawn up for each station, and accepted and signed by the men; and it is hoped that an era of peace has been thereby definitely inaugurated between the Companies and their workmen in Italy.

The Law, alluded to in the last report, for enabling the Municipalities to assume—by compulsory purchase—the conduct of various public services (including the supply of gas) has now been finally passed by the Italian Parliament.

In consequence of the reduced profits of the Union des Gaz, through increase of interest and amortizement on the bond debt, increase of working expenses, and fall in the selling price of residuals, that Company reduced their dividend by 1 per cent., obliging the Continental Union to reduce theirs to the same extent, whilst, however, adding £2535 to the undivided profits.

The net profits for the year ending June 30 amounted to £67,517 16s. 8d. From this, the Directors recommend a dividend of 7 per cent. per annum on the ordinary stock, free of tax, and of 7 per cent. on the preference stock, less tax. The Directors have also decided to transfer the sum of £3000 from the balance of undivided profits to reserve fund. After deducting the interim dividend paid in July last, and paying the balance of 4 per cent. on the ordinary and 3½ per cent. on the preference stocks, and providing for the transfer to reserve account, the total amount carried forward to the new account will be £10,405 15s. 1d.

It is proposed to pay the Dividend as usual on Jan. 4 next.

The Director who retires by rotation is F. Tendron, Esq.; and the Auditors, A. T. Eastman, Esq., and C. P. Crookenden, Esq., also retire—all of whom, being eligible, offer themselves for re-election.

The CHAIRMAN said many of the proprietors must have come there that day feeling somewhat anxious about the affairs of the Company, in consequence of the reduction in the dividends. He trusted that now they had heard the report, a certain amount of the anxiety had been allayed; and he hoped that, after they had listened to the facts and figures which he proposed to submit to them, they would leave the meeting in a more comfortable state of mind. The accounts which the Secretary had read showed that the profits for the year were £6229 less, and that consequently the dividend which the Directors recommended was 7 per cent., against 8 per cent. for the previous year. He would show them that this diminution was chiefly due to causes which the Directors hoped were only temporary. As most of the proprietors were aware, the Company had only two small stations—Messina and Montargis; and it would be convenient to deal first with the business of these towns, and then to pass on to the affairs of the French Company. Now the profit on the lighting of Messina and Montargis was £1998 less, owing to the higher rate of wages which they were obliged to pay, to the introduction of the incandescent burner which consumed less gas, to the low price of coke and tar, and to an unfortunate accident which happened to one of the largest gasholders. On the other hand, it was satisfactory to note that they had had an increase of 342 new consumers; and it was to be hoped that as long as this expansion in the business continued—and they had no reason to doubt that it would—the increase in the working expenses would be more than compensated for. He would now refer to the affairs of the Union des Gaz, and would do so at some length, for it was mainly on that Company that their prosperity depended. Now the vitality of the Company was proved by the fact that during the past year there had been an increase of 12,306 in the number of consumers; an increase of 7½ per cent. in the gas sold; and an increase of 5½ per cent. in the rental. Now all these increases were most satisfactory; but, notwithstanding this expansion, the net result was that the earnings were £16,041 less, and that the dividend of the French Company was 9 per cent., against 10 per cent. in 1902. The net result to the Continental Company was that the dividend from the Union des Gaz was £5487 less than last year. The proprietors would naturally ask why there had been a decrease in the profits as there had been an increase in the rental. The explanation was simple. The reduction of the profits was due: First, to the increase in the interest paid on the obligations and their amortization; secondly, to the increase in the cost of labour; thirdly, to the decrease in the selling-value of coke; fourthly, to the reduced prices of gas in Milan and elsewhere; and fifthly, to the coal-tax. Now, with regard to the interest on the bonds, he must explain that, in consequence of the large increase in the gas sold, it was absolutely necessary to enlarge and improve the works; and for this purpose, additional capital had to be found. The cheapest way to raise the money was by issuing 4 per cent. obligations; and these had been, and were being, readily taken up in France. Now the continual issue of these obligations had entailed a corresponding increase in the interest. He would go back to 1896. Seven years ago, the bond debt was £340,000. Now it was £1,200,000. Consequently, there had been an increase during these seven years in the annual amount of interest and amortization of these obligations, of £51,461. All the money raised by these obligations had been spent on the stations. During the past year, £210,791 had been so spent. Gas companies must conform to the law of expansion; and, in these days of labour difficulties, labour-saving appliances must be adopted. But new buildings and machinery cost money; and they had had to spend it, and had not yet had time to reap the ultimate benefit that must eventually accrue to them. As to their wages, the increase for the seven years under review had been large, for they were now paying £44,000 more per annum than they did in 1896. The labour troubles of Italy had been one of the chief causes of this extra expenditure. At present they were having no trouble in that country with the workmen; and he sincerely trusted that this peaceful state of things would continue. As regarded the coke sales, the proprietors no doubt knew that the prices on the Continent for this commodity had been for some time very low, and the consequence was that their profits from this source were £9500 less than in the previous year. He now came to the selling price of gas. For a long period, as they were aware, the Company had disputes with the Municipality of Milan—disputes which were now happily settled. But they had had to pay heavily for peace; and the result was that, in consequence of the reductions, they were selling gas in the city at a very low price. Further reductions, too, had been made elsewhere in order to renew concessions. But the proprietors must bear in mind that these reductions necessarily stimulated consumption; and this was proved by the increase of 60 per cent. in the amount of gas sold compared with seven years ago—a very large increase, which proved the vitality of the business of the Company. As for the coal-tax, they had no alternative but to pay it; and this annual drain on their profits amounted to no less than £10,000—an amount just equal to 1 per cent. on the dividend of the Union des Gaz. So much for the past. Looking to the future, it was doubtful whether the bond capital of the Union des Gaz would be reduced. The demand for gas at Genoa had lately so increased that soon they would have to construct in the city an entirely new works; so that he did not think there could be any immediate reduction in the interest on the bonds. He trusted they would have no immediate increase in the cost of labour; and, with improved machinery, they had already in the large stations a reduction in this respect. The future state of the coke market could not be even guessed at; but they must all of them hope that the lowest prices had already been reached. The reduced price for gas would, as he had said, be largely compensated by the increased consumption; and as for the coal-tax, it had, he feared, come to stay with them. Speaking generally, there was no doubt their prospects were brighter. This was an exceptional year, because there had not been time to reap the advantages from their heavy expenditure. From Milan they had better returns, because last year there was unavoidable disorganization during the erection of the new machinery, and the carbonizing was not so good as it might have been. There was now a distinct improvement in this respect; and altogether it might be hoped that at last the tide had turned. Since June there had been a very marked improvement in the returns. With one small exception, there were no disputes with any of the Municipalities served by the Union des Gaz. It was true that at Messina, which was lit by the Continental Company, they had difficulty in obtaining the payment of a large and undisputed debt owed by the town. But negotiations were now in progress; and it was hoped that the Municipality would soon meet their liabilities. He said, with these exceptions, they were at peace with all their towns; and, in course of time, let them hope that the past prosperity of the Company would return. They had a more difficult task in administering its affairs than their predecessors had. But they had, during the late anxious times, had the proprietors' full confidence; and, with this invaluable support, they were encouraged to carry on the work with energy, and to look forward hopefully to the future.

The DEPUTY-CHAIRMAN (Mr. F. Tendron) seconded the motion. He remarked that he was sure the proprietors must all have been struck with the remarkable speech which had been made by the Chairman. It was one continuous statement of facts—facts so important in the history of the Company that it was of no little satisfaction to him to know that it had been taken down verbatim, and every proprietor present would have an opportunity of recalling what he had heard, and every absent proprietor would have an opportunity of reading it attentively. The speech was well worth most careful study.

Mr. C. W. ODDIE said reference was made in the report to a certain legislative enactment in Italy which would enable municipalities to purchase portions of their undertaking. He should like to know how the Company stood in regard to that (he took it the Chairman would have alluded to it if there had been any apprehension on the part of the Board), and also whether the terms on which that legislative provision could be enforced against the Company involved any risk or danger. They had the Metropolitan water undertakings at the present moment trembling before a Court of Arbitration; and every day excited more and more a feeling of disappointment among those who had been shareholders in these concerns. He sincerely hoped that this Company were not placed in a similar position, and could be bought out by the Italian corporations at any moment at confiscation prices, or, at any rate, prices that would be unfair to the proprietors who had large interests in the undertaking. He also inquired whether there was any quotation for the shares of the Union des Gaz in the French market.

Mr. G. A. CAVE ORME said the proprietors must all have been very pleased to hear the hopeful words that had fallen from the Chairman. He found from the accounts that, although the Chairman's words were so hopeful in regard to the future dividend, the Directors had found it necessary to transfer a sum of £3000 to the reserve account. He believed this was the first occasion on which it had been necessary for this to be done. [No, no.] However, it was a fact that the actual reserve of the Company amounted to £35,396; and he did not know why the transfer should have been made, unless it was the idea of the Directors that the dividends were likely to be still further reduced. They had had some seriously diminishing dividends for some years past now; and there did not seem to be much prospect of an immediate improvement. It appeared to him therefore that something should be done, in order to reduce the expenses as far as possible. One saw that the actual amount of capital that was dealt with by the Continental Union Gas Company was only something like £200,000; and the whole of the rest was invested in the Union des Gaz. He did not wish to make anything like a hostile speech. He was a shareholder, and did not know much about the internal affairs of the Company; and they did not see the reports until they came to the meetings. But he desired to call attention to this fact. He saw before him no less than six gentlemen who were Directors of this Company, and some of them were also Directors of the Union des Gaz. The expenses of the London office, amounting as they did to £3203, must, he fancied, include the Directors' fees. Well, those gentlemen who were Directors of the Union des Gaz were no doubt well paid by that Company. He did not know what they received also as Directors of the Continental Union Company; but, as the Continental Union had only to deal with a small capital in itself, possibly it would be only fair that (if they were very heavy) the fees of the Directors or the number of Directors should now be diminished. This would be one way in which the expenses could be reduced. He did not wish to go through the whole thing; he was hardly prepared to do so. But there were many other points one might find by which, in all likelihood, they might improve the financial affairs of the Company. From the point of view of a shareholder, he did not know that it was necessary to have such a large reserve as £35,000, when the actual business of the Company was so small, because, although the reserve was a proper thing for keeping up the dividends (if possible) to a regular level from time to time, surely £35,000 as a reserve on a capital of less than £200,000 was a very large proportion. It seemed to him that the proprietors might have a little of that in their dividend now. As he said before, he had no wish to make a hostile speech. All he was doing was seeking for a little fuller information with regard to these matters, which were, as a rule, laid before shareholders either in the Chairman's speech or in the report.

The CHAIRMAN, in answer to the first question as to the Municipalization Act, said that the Act, as passed by the Italian Legislature, was entirely favourable to the companies who might be bought out. The Directors watched every clause most carefully; and, if ever the Act was brought into play (which he very much doubted, so far as their own Company were concerned, although it was impossible to speak definitely in these days), it would not be unfavourable to them. A Commission were now sitting for settling what would correspond in this country to the clauses of the Act—that was to say the minor rules; and the Board had submitted to the Commission sundry statements which had been received in a very equitable spirit, as their suggestions had always been by the Italian Government. He was glad to have this opportunity of publicly stating the appreciation of the Directors of the way in which this and other foreign companies had been treated by the Italian Government. Of course, the question of purchase had been mooted in the great towns the Company lighted; but no definite action had been, or was being, taken as yet with regard to carrying out the powers of the Act. As to the second speaker's remarks about the finances, he (the Chairman) must point out to him that if he, or any other gentleman, had had any experience in the management of gas companies, he would know that it was impossible for a gas company to say "We will not do so much business." They must go on. It was true that the Directors could, as he hoped and believed they did on the Continental Board, watch the action of the officers in being economical by a proper supervision of their works; but the Directors could not regulate the expenses in the way many other classes of companies could do. With regard to the question of the reserve, it now stood at £35,000. All he could say was that, instead of diminishing the reserve it was his hope that it might reach £50,000 [hear, hear]; and in view of the peculiar organization of the Company, he thought the wisdom of increasing the reserve was fully justified. Concerning the delicate question of fees, if the proprietor had taken the trouble, before speaking, to refer to the statutes of the Company, he would have seen that the fees were reduced automatically with the dividends. This was clearly stated; and it had taken place. As to the Union des Gaz shares, they were quoted daily in the French financial list.

The motion was then unanimously adopted.

On the proposition of the CHAIRMAN, seconded by Mr. N. E. B. GAREY, the dividends recommended in the report were declared.

Moved by the CHAIRMAN, and seconded by Mr. R. HESKETH JONES, Mr. Frederick Tendron was heartily and unanimously re-elected to his seat on the Board.

Major STEWART INGLIS proposed, and Mr. FRANCIS TEE seconded, the re-appointment of the Auditors (Mr. A. T. Eastman and Mr. C. P. Crookenden), at a fee of 100 guineas each.

The proposal was unanimously agreed to.

The CHAIRMAN said his last resolution was one of thanks to the Secretary and Manager and Engineers and staffs of the Company and of the Union des Gaz, both in London and abroad, for the special services rendered by them during the past year. He did not wish this to be a mere formal resolution. Their Secretary, very often at a minute's notice, had gone abroad to settle what had been described as the "*organico*," which was an exceedingly difficult and complicated arrangement with the workmen. He (the Chairman) could not explain it in few words, but, roughly speaking, it was a number of little rules, which went so much to define the men's actual duties. Their Secretary had settled that in Milan (where some hundreds of hands were employed), in Genoa, at Alessandria, and in Messina. This had been no light work; and Mr. Himing had been out several times when little difficulties had arisen, both in France and Germany. He had gone cheerfully and at once, and had done his work well, and to the entire satisfaction of the Board. It had been a year of strain in Milan and Genoa; and he also wished to publicly thank the Engineers and other officers there for the excellent work they had done. Everything with the workmen had gone on well lately, and without a hitch; and this was due entirely to the action of their officers.

Mr. J. HORSLEY PALMER seconded the motion, which was cordially agreed to.

The SECRETARY, in the name of all the officers and their staffs, thanked the Chairman and Directors and proprietors, and especially the Chairman, for the favourable terms in which he had spoken of himself.

Mr. ODDIE moved a vote of thanks to the Chairman and Directors for seeing the proprietors through the troublesome times of which they had heard. They all hoped for a better time to come.

Mr. CAVE ORME said that, lest it should be thought that anything he had previously said was ungracious, he had great pleasure in seconding the resolution.

The motion was unanimously passed.

The CHAIRMAN, in responding, said he could assure the proprietors that these were not mere formal words as to the year having been an exceptionally anxious one. The Board, however, did not care so long as they felt that the proprietors knew they had done their best, and had done all they possibly could to advance the interests of the Company.

The proceedings then closed.

IMPROVED GAS LIGHTING IN CHELSEA.

Last Wednesday evening, the Chelsea Borough Council adopted a scheme, the estimated cost of which is £649, for improving the gas lighting of the district. New lanterns with incandescent burners are to be fixed to the existing lamps in 28 streets, additional lamps with incandescent burners are to be put up in seven streets, and Scott-Snell lamps fixed in ten places. A letter was read from the Scott-Snell Company, stating that the price in future for lamps of their latest improved type, each lamp giving a light of about 600 candles from one burner, and fitted complete with anti-vibrator burner, will be £9 per lamp net, instead of £8 10s. as formerly; the expense of erecting the lamps to be charged at cost price. With regard to their agreement for the maintenance of lamps (30s. per lamp per annum), which expired on the 1st ult., their price for maintenance in future will be £3 per lamp per annum, which will include the full maintenance of the lamp, the supply of mantles, renewal of any parts damaged or worn out by ordinary wear and tear, cleaning, and painting the lantern once a year; the Company, however, not to be held responsible for damage to lamps or lanterns caused by collisions of vehicles, or any other means outside their control. In explanation of this increased charge, the Company pointed out that the work had been carried on during the past year at a considerable loss, owing to the circumstance that it was their first experience of full maintenance of lamps, and that the usual price paid by Councils for the maintenance of ordinary incandescent lamps is 27s. per lamp per annum. It was decided to agree to the additional charge, on condition that the Company supply new lamps at the same price as formerly—viz., £8 10s. each.

PRICE OF GAS IN BUENOS AYRES.

The Buenos Ayres correspondent of the "Financial Times," in a communication dated the 14th ult., states that the Municipal Commission of the city are proceeding, with unabated vigour, in their campaign against the foreign Companies, which are, unfortunately, subject to their official control and to the caprices of some of the members. After remarking that the Tramway and Lighting Companies are at present the principal objects of attack, he goes on to say, with regard to the latter, that "already violent attempts have been made by the 'City Fathers,' to force a reduction in the price charged by the Companies for gas; but as the tariffs for this illuminant were, by an agreement entered into in 1896, made subject to variation according to the premium on gold, the Companies naturally object to any alteration of their fixed limits so long as the gold premium remains stationary. The Municipality also claim the privilege to inspect the books and accounts of the Companies, on the plea that some vague condition in the concession, in regard to this point, conferred upon them the right which hitherto has not been claimed. The authorities have just published the report of the Direction of Public Lighting in regard to the price of gas as the result of the decree of the 24th of October last. This report, which has been adopted by the Municipal Commission, establishes a reduction of about 30 per cent. in the price now charged by the Companies, and contains an elaborate financial plan, showing how the Companies, under the proposed tariffs, could provide for all working expenses, establishment charges, amortization at the rate of 2 per cent. per annum, an annual appropriation of 1 per cent. to reserve fund, and 7 per cent. interest on the capital employed. Whether these calculations have a sound or unsound basis is at the present moment immaterial to the issue, though the past results to shareholders would point to their being incorrect. Under a Municipal Ordinance enacted in August, 1902, the Intendente is empowered to publish a decree calling upon the Companies, within three days from the date of publication, to acknowledge or object to a resolution of the Municipal body. In the latter event, the Commission, at their following meeting, dictate the course to be pursued in the enforcement of the decree. This notification will be made during the next few days; and in the meantime the Companies are awaiting fresh developments, having resolved at all costs to resist the demands of the Municipality."

METROPOLITAN WATER ARBITRATION.

(*Before the Right Hon. Sir* EDWARD FRY, *Sir* HUGH OWEN, G.C.B., *and Sir* JOHN WOLFE-BARRY, K.C.B.)

The Award in the East London Company's Case.

At the sitting of the Court last Tuesday, the first of the awards was made—in the matter of the East London Water Company.

The PRESIDENT said the Court were now prepared to state the conclusions at which they had arrived in the case of the East London Company. Before so doing, they thought it desirable to make a few observations. He was not about to deliver a reasoned judgment in explanation of all the considerations by which they had been influenced in their ultimate findings; for their functions had been largely those of a Jury rather than those of a Judge. But there was one topic of such general public importance that they deemed it desirable to state the conclusions at which they had arrived in respect to it. The matter to which they referred was the quality of the water from all sources supplied to the customers by the East London Company, and incidentally by the other Companies whose cases had already been before them. This question was fully considered by the Royal Commission presided over by Lord Balfour of Burleigh; and the conclusion at which they arrived was stated by them in the following terms in their report of September, 1893:—

> We are strongly of opinion that the water as supplied to the consumer in London is of a very high standard of excellence and purity, and it is suitable in quality for all household purposes. We are well aware that a certain prejudice exists against drinking water derived from the Thames and the Lea because these rivers are liable to pollution, however perfect the subsequent filtration, either by natural or artificial means, may be. But, having regard to the experience of London during the last thirty years, and to the evidence given to us on the subject, we do not believe that any danger exists of the spread of disease by the use of this water, provided there is adequate storage and that the water is sufficiently filtered before delivery to the consumers.

The subsequent Commission presided over by Lord Llandaff stated in their report of December, 1899, that, speaking generally, they accepted the findings of the earlier Commission. Upon the question of the quality of the water supplied, the Arbitrators had heard evidence in the cases of the East London, the New River, and the Grand Junction Companies; and, subject to the question of the adequacy of the storage of the last-mentioned Company, or some improvement of their filtering materials, with a view in either case of more adequately removing innocuous or objectionable discolouration during periods of flood in the Thames, they found nothing in the evidence before them to lead them to dissent from the finding of the two Commissions. The water had been examined bacteriologically, not only by Sir William Crookes and Professor Dewar, who occupied a position of great independence towards the Companies, and superintended daily and almost hourly investigation into the condition of these waters, but by eminent bacteriologists like Dr. Klein and Dr. McFadyen. In the result, it had not been shown to them that a certain bacterium noxious to human life or health had been discovered in the waters of these Companies. No outbreak of zymotic disease, no single instance even of disease, had been traced to the waters of any of the Companies; and the general good health of the district supplied by them was a remarkable circumstance inconsistent with the notion of any ascertainable danger to the community. With regard to the pollution of the Rivers Thames and Lea, it was at least doubtful whether in the near past it had not diminished by the increased stringency of the regulations of the Conservancies of these rivers; and they concluded from the evidence before them that the quality of the water delivered had shown no sign of deterioration, but rather the contrary. It had been shown to them that knowledge of the conditions of successful filtration had grown more and more exact, and that the art and practice of filtration had been improved with time. So far, therefore, as they could forecast the future in this respect, they saw no reason to doubt that scientific skill would keep pace with any increased pollution which might occur. They felt, therefore, bound to hold that the waters of the Thames and Lea must be taken for the purposes of their award as capable of being supplied in excellent condition for domestic purposes. A view had been presented to the Court by Dr. Klein, and more or less supported by other witnesses, that isolated cases of typhoid fever and cases of infantile diarrhœa might be due to the occasional presence of pathogenic bacilli which had made their way through the filtration beds, from which the inference had been suggested that no crude water subject to pollution could ever, under any circumstances, be a safe source of supply. In their opinion, the evidence before them had failed to substantiate such a proposition, and they could regard them only as scientific hypotheses. The duty of the Court with regard to matters of science was not, as they held, to decide on the probabilities of theories or speculations. For such work, the Court was incompetent. Their duty was to take their stand on scientific truth so far as it had become the common property of all persons conversant with the subject that was on the solid ground that it had been permanently reclaimed from the vast ocean of ignorance by which we were surrounded. Beyond this, they could not go, One other observation he wished to make before stating the result of their award, and that was that they came to the conclusion that the limit of 10 per cent. was not likely to have been reached by the Company, and therefore the questions which clustered around that event did not occur in this case. The conclusions at which they had arrived were these: Assuming that they were right on the question of the liability of the undertaking to be valued as subject to the payments to the Chamberlain's Fund, the sum which was to be paid was £3,900,000. But if, on the other hand, they were wrong with respect to that contention, then the sum was £4,300,000. He would now read the formal special case in which they proposed to embody their award; and he did so for two reasons. It would give to the East London Company an opportunity, if they thought fit (which he did not think they were likely to avail themselves of, after what had been said by Mr. Balfour Browne), of requiring the Court to state another alternative—viz., in regard to the correctness or incorrectness of their view with regard to their sterilization fund. If this were mentioned to the Court on Thursday morning, they would attend to it. The other reason he had for reading the form of the award was that they had not signed it, and it would give parties on either side an opportunity to call attention to any points of form which might arise. The form was as follows: "The Court of Arbitration under the Metropolis Water Act, 1902. The East London Water-Works Company claimants, and the Metropolitan Water Board respondents. Award stated by the Court of Arbitration by way of special case for determination by the Court of Appeal under the 23rd section of the said Act: (1) The East London Water-Works Company and the Metropolitan Water Board have appeared before us by Counsel on the 26th, 27th, 28th, 29th, and 30th days of October, and the 2nd, 3rd, 5th, 6th, 7th, 16th, 17th, and 19th days of November, 1903; and we have heard the Statement of Claim of the East London Water-Works Company as amended pursuant to our order dated the 29th of May, 1903, and the answer of the Metropolitan Water Board to the said claim, and the evidence of certain witnesses taken on their oral examination at the hearings; and we have examined the exhibits referred to in the course of the hearing; and we have heard what was alleged by Counsel on both sides. (2) During the hearing of the said matter, a question of law has arisen, which we have decided. On this question, we held that, according to the true construction of the East London Water-Works Acts of 1886 and 1894, and the Metropolis Water Act, 1902, the undertaking of the East London Water-Works Company ought to be valued as subject to, and not as free from, the obligations to contribute to the Chamberlain's Fund created by the two first-mentioned Acts. (3) We, acting as the said Court, find and award that the sum to be paid by the Metropolitan Water Board to the East London Water-Works Company, in manner provided by the said Metropolis Water Act, 1902, for the value of the undertaking of the said East London Water-Works Company, together with such allowances as we think just for recoupment of any loss of interest pending reinvestment, as well as for the cost of reinvestment, is as follows: (A) If the Court of Appeal shall hold that we were right in our decision of the said point of law, then the sum of £3,900,000; (B) if the Court of Appeal shall hold that we were wrong on the said point, then the sum of £4,300,000. Provided always that the payment, hereinbefore directed to be made, shall be independent of, and additional to, the transfer in the fourth section of the said Act mentioned, of debts, debentures, stock or rent charges, or other annual payments, and also of any payment directed to be made by the Metropolitan Water Board to the East London Water-Works Company under section 40 of the said Act, and provided also that the finding and award shall not derogate from the power of the said Court of Arbitration to make any further award in respect of any costs, charges, and expenses mentioned in the 8th subsection of the 23rd section of the said Act, other than the costs incurred in this arbitration, or the power of the Court to settle and determine any matter or question, excluding the matter hereby determined, but including any adjustment of accounts between the parties which is incidental to the matters by the said Act referred to this Court or consequential thereon."

Mr. CRIPPS said the Company were very much obliged to the Court for the opportunity of considering the form of the award. They would do so, and, if necessary, would say anything there was to be said. At present, they did not desire to say anything.

The PRESIDENT: I will mention the order as to costs: Refer it to Master Baker of the High Court, or such other Taxing-Master as he may nominate on his behalf, to tax the costs of the East London Company in the arbitration between them and the Water Board as between solicitor and client. The order is that the Metropolitan Water Board pay the amount of the said costs when taxed. The Taxing-Master whom I have named has been good enough to intimate to us that he is willing to undertake, either personally or by a person to be named, the duties of the taxing of this arbitration.

The Court then proceeded to deal with the West Middlesex Company's case, the report of which will be given in our next issue.

At the opening of the proceedings in the West Middlesex case on Thursday last, a discussion took place as to the form of the award in the East London case, as the parties might require to state a case.

The PRESIDENT then asked that the understanding given by the parties in the New River case, as to the appointment of an independent surveyor to prepare a schedule as to the valuation of the Clerkenwell Estate and other properties, should be carried out at once, as it was desirable that it should be done before the Court adjourned for the Christmas vacation.

Mr. CRIPPS undertook that steps should be taken in order to endeavour to comply with the wishes of the Court.

The PRESIDENT subsequently announced, in reply to Mr. Moulton, who asked for an adjournment until beyond Jan. 11 after the vacation, that the Court would resume their sittings on Jan. 18. He stated, however, that the West Middlesex case would have to be finished before the Christmas vacation.

On the resumption of the proceedings yesterday (Monday) morning, the first business was the delivery of

The Grand Junction Company's Award.—*See pp. 699 and 764.*

The PRESIDENT: The conclusions at which we have arrived in this case are as follows: If the Court of Appeal shall hold that we are right in the decision on the point of law which has been raised with regard to the incidence of the sinking fund, then the sum to be paid is £3,349,500. If, on the other hand, the Court of Appeal shall hold that we are wrong on the point of law, then the sum of £3,552,500. The form of award we propose, as a special case, stating that point of law, will follow that which we have adopted in previous cases. I do not know whether Counsel have any opposition to make

The West Middlesex Company's Award.

The PRESIDENT announced that the West Middlesex Company were awarded the sum of £3,524,000, apart from the costs incurred in the arbitration, which were to be taxed as between solicitor and client. Our report of the speeches and evidence will appear next week.

The Clerkenwell Estate of the New River Company.

The PRESIDENT asked what conclusion had been come to by the parties with regard to the Clerkenwell Estate.

Mr. CRIPPS said he had had an opportunity of going through the special case, and it would be delivered to the Court after Counsel for the Water Board had seen it. He had not any particular instructions at present. He asked whether the matter might not be left until the Court had seen the form of special case, and then perhaps they would think it might stand over for a time.

The PRESIDENT said the Court proposed to allow the matter to stand over till the Court of Appeal had given their decision, provided that the Company were able to succeed in inducing them to expedite the hearing. Counsel might state that, in the opinion of the Arbitrators, this course would be to the interests of the public.

Mr. CRIPPS said that a joint application would be made to the Court of Appeal.

At a subsequent stage, it was announced that the Master of the Rolls had replied to the application which had been made to the effect that arrangements would be made when it was decided in which Court the appeal should be heard. He also stated that the Court of Appeal regarded the matter as one of urgent public importance, and would do all they could to facilitate its progress.

The Court then adjourned till the 18th prox.

The Close of the Grand Junction Case. Twenty-Seventh Day.—Monday, Dec. 7.

At the conclusion of the argument as to the Company's right to take water from the Thames, as reported last week,

Mr. MOULTON continued his speech on behalf of the Water Board. With reference to the quality of the water supplied by the Company, Counsel said it was such that fault was rightly found with it at times. The reports of the Water Examiner showed that, principally by reason of the Company taking water at flood times, it did not supply the quality that it could, and therefore the quality that it should. He did not push this to an unreasonable extent; he did not say that the Thames was not a proper source of supply for a portion of the month. The importance of using storage also was emphasized by the Balfour and Llandaff Commissions. The latter in their report said they thought it was imperative that the Company should pass water from the river into a storage reservoir before letting it on to the filter-beds. They pointed out that the reservoirs provided by the Staines Joint Committee, and certain others which they recommended for additional supplies from the Thames, would be sufficient for the purpose of subsidence as well as storage. The real question for the tribunal was this: Having obtained these powers for Staines, and having thus the capability of doing that which the Llandaff Commission said should be imperative, which the Balfour Commission thought ought to be done, and which engineers thought so important, would the Company have left the Staines reservoirs lying idle and have done nothing with them? Taking into consideration the power of public opinion, he thought this was absolutely impossible. The learned Counsel then commented upon the accounts of the Company. The actual revenue in 1902 was £105 000. To this there were a few suggested corrections and adjustments. But they really amounted to very little; and it appeared to him that they were incapable of support. That the ingenuity of the Accountants had been unable to suggest more adjustments was a proof, he submitted, that the year 1902 was a very fair one to take. The tribunal would have to form as sound an idea of the future of the Company as possible, both with regard to receipts and expenditure. The Company was one which *ex necessitas* could do nothing without touching sterilized powers. The Company had overdrawn its capital account by about £23,000. It had capital powers which it must use for the purpose of this £23,000, for the purpose of continuing to lay intercommunication pipes, and for the purpose of taking in the new supplies. He contended, on the question of the rate of dividend, that the Company had considered as 10 per cent. shares those which were only really 7½ per cent.

Twenty-Eighth Day—Tuesday, Dec. 8.

Mr. BALFOUR BROWNE said that whereas in previous tables the calculation had been stopped at the year 1911, because the capital was exhausted, in the tables which would now be presented (which he had promised the previous day), it was assumed that beyond that period they would go on spending capital, and that Parliament would give them power to spend capital; but always upon the condition of the sinking fund and sterilization clause. They assumed that they would have to go on spending on extensions of mains £10,000 a year up to 1930. The effect was that £55,000 had been knocked off. By the later tables, they would get the £55,000 which they had paid in the past, and which they had calculated upon for back-dividends, or the time would be postponed in which they could pay their back-dividends. They hoped that the Staines reservoirs would in time pay the whole of the back-dividends.

Mr. *Daniel Hill* was then called, and produced tables to show what would be the reduction effected upon the original claim if the capital raised for the undertaking of the Staines Reservoirs Joint Committee was included in the working expenses of the Company. The net water-rental rose from £183,478 in 1893 to £245,297 in 1903; and the working expenses from £76,570 to £111,700. The net revenue rose from £106,908 in 1893 to £133,597 in 1903. The debenture interest in 1893 was £11,007, rising to £13,605 in 1903. In 1897, the first payment (£515) was made on account of the Staines reservoirs; in 1903, the amount paid was £12,529. In the Company's accounts £15,729 was put down; but this included five quarters—four of which only were chargeable to the year. The net profits available for dividend, after charging expenditure on the Staines reservoirs, amounted in 1903 to £107,463, as against £92,491 in 1897 (the first year the expenditure was incurred), and as against £95,901 in 1893. A further table showed the estimated water supply, capital expenditure, revenue, and profits from Oct. 1, 1903, to Sept. 30, 1930, charging Staines expenditure, interest, sinking fund, and 1 per cent. for management. In 1904, the average number of supplies was estimated to be 75,402; population, 488,605; water supplied (at 35 gallons per head per day, decreasing to 33 in 1906), 17,101,175 gallons; capital expenditure, £10,000 (and £10,000 each year to 1930); net water-rental, £253,297; working expenses, estimated at 45 per cent. on rental, £113,984; net revenue £139,313; debenture interest account, £15,675; extra expenses (Staines reservoirs), £1500; interest, £12,500; and net profit available for dividend, £109,638. In 1930, the estimates were: Supplies, 140,402; population, 909,805; water supplied (33 gallons per head per day), 30,023,565; capital expenditure, £10,000; net water-rental, £461,297; working expenses, £207,584; net revenue, £253,713; debenture interest account, £23,625; sinking fund under Act of 1902, £12,987; 1 per cent. for management, £2600; total, £39,212; interest (Staines reservoirs), £12,500; sinking fund, £16,895; 1 per cent. for management, £4167; total (Staines reservoirs), £33,563; net profits available for dividend after deducting all expenses, including Staines, £180,938. Surplus profits over maximum dividend of £117,150; multiplier, 2¾ per cent. table, £49,057. The total amount of back-dividends unpaid came to £722,412; and the value at June 24, 1904, £457,396. Deducting £16,215 available for back-dividends on June 24, 1904, the amounts were: Back-dividends unpaid, 1930, £706,197, and value as at June 24, £441,181. The sum of £441,181 was the present value at June 24, 1904, of £706,197. The claim was: Maximum dividend of £117,150, multiplied by 36·36, £4,260,000, *plus* £441,181 = £4,701,181; *plus* allowance for cost of reinvestment to cover brokerage and stamps, 1 per cent. on £4,701,181 = £47,012; *plus* an allowance for recoupment of loss of interest pending reinvestment, 1 per cent. on £4,701,181 = £47,012; making a total claim (assuming the Staines expenses must be brought into account) of £4,795,205, to which was to be added an allowance for covering the costs incurred, and to be incurred, in consequence of the passing of the Act of 1902, including the costs of the arbitration under the Act, not yet ascertainable. The original claim was for £4,863,195. Witness explained that the Engineers thought they would not draw on the Staines supply till 1915; and therefore the sinking fund was not taken into account before that year. But deducting the Staines expenses, as well as the ordinary working expenses, he estimated that the profit of the Company would be: In 1904, £109,638; in 1905, £114,088; in 1906, £118,688; in 1907, £115,669; and in 1909, £119,964. The last-mentioned sum was more than sufficient to pay the maximum dividend, which took £117,150. In 1929, the net profit available would be £60,913 more than sufficient to pay the maximum dividend.

Mr. *Walter Hunter*, in answer to the PRESIDENT, stated that he assumed the West Middlesex Company or the New River Company would take water from the Staines reservoirs in 1907. The Grand Junction Company were liable for one-third of the working expenses with the exception of the sinking fund. Deducting interest, the total expenses of the three Companies would be £23,250—£8000 a year each. Until the Staines reservoirs were used by the New River Company or the West Middlesex Company, of course, there would be no expenses at all. He estimated the ordinary working expenses of the Company would be covered by 45 per cent. upon the net rental.

In reply to the PRESIDENT, who asked the average selling price of the shares in the last ten years,

Mr. BALFOUR BROWNE said he meant to hand in a table. He did not think it worth while to recall Lord Rothschild and witnesses of that class, because that evidence had been given in other cases.

Mr. MOULTON said he would not object to the Court taking cognizance of this evidence. He submitted, on the question of dividend, that the residue of the capital of the Company under the Act of 1855 was limited to 7½ per cent., and the dividend was settled by its being part of the general capital of the Company.

Mr. FITZGERALD said that the capital of the Company was rearranged and put upon a new footing in 1855; and the general capital was fixed at £700,000—£546,000 of 10 per cent. capital, and the residue 7½ per cent. He submitted that the Court ought not to hold that the 10 per cent. was the capital here authorized unless the language was quite plain.

Mr. BALFOUR BROWNE, in reply, contended that, upon the construction of the Acts, the general capital of the Company included both ordinary and preference dividends. The original capital was entitled to 10 per cent.; and this was part of the original capital.

The PRESIDENT said the question to be decided turned upon the true construction of sections 4 and 5 of the Grand Junction Water-Works Acts, 1868. The question was whether or no the £300,000 which was raised under that Act was created capable of bearing a dividend of 10 per cent., or of 7½ per cent. By the first clause, the Company were empowered from time to time, in addition to their existing authorized capital of £700,000, to raise, by the creation and issue of new shares, any sums not exceeding in the whole £300,000. They might create such shares partly or wholly as ordinary shares or partly or wholly as preference shares, as they thought fit. Section 5 provided that all the shares created and issued by the Company under the Act should be part of the general capital of the Company, and, except as otherwise provided, should entitle the holders to like privileges and like restrictions and incidence as if the shares so created and issued were part of the original capital. It was to be observed that there were three qualifications of the word "capital." Section 4 spoke of existing authorized capital; the beginning of section 5 of general capital; and the end of the section of original capital. The words "original capital" appeared to the Court to be of a very simple character, and had a very intelligible and plain meaning—viz., the capital of the Company in its first inception. This was, according to the ordinary usage of the English language, the meaning of the words "original capital." In the year 1811, a statute was passed which authorized a subscription among the promoters and undertakers of

that day of a sum of £150,000 in shares, with an unlimited power of assigning dividends to it. The same statute gave power to raise a further sum of £150,000. The Acts of 1835 and 1852 gave other powers of raising further capital. Then, in the statute of 1855, the Legislature were minded to declare the position of the Company with regard to its capital; and it provided that, after the passing of the Act, the general capital of the Company should be the sum of £700,000. Then it gave the proportions with regard to these shares, and gave power to raise £200,000 in new shares under the Act. Having given this power, the Legislature inserted a proviso to the effect that, with reference to the Water-Works Clauses Act, 1847, in respect to the amount of profit received by the undertakers when the water-works were carried on for their benefit, the prescribed rate of profit should be as follows: With regard to the sum of £546,000, the amount which, immediately before the passing of the Act, the Company were authorized to raise, £10 in the £100 for the year; as regarded the residue, £7 10s. per £100. Of this sum of £546,000, it was not in dispute that the £150,000, which was the original capital, in the year 1811, formed part; and therefore the original capital was entitled to bear the rate of 10 per cent. per annum. This seemed to the Court to be the true construction of these clauses. It was suggested that there were difficulties, if not absurdities, in so computing it. In the first place, it was said that the original capital ought to be construed as existing capital. Why they should give this meaning when the words "existing capital" were used in the preceding section, where the Legislature wished to refer to the existing capital, was not easy to understand. Then it was suggested that it was equivalent to general capital, and referred to the whole capital of £700,000 mentioned in the Act of 1855. But that was met by this very great difficulty, that, if it were referred to the general capital with the whole sum, the effect would be that one would be referring to a mixed sum, part of which bore 10 per cent. and part 7½ per cent.; and therefore we could not tell to which of the two it belonged. Further than this, the Legislature had drawn a distinction between general and original capital; and by so doing the legislation of 1868 fitted in with that of 1855, because in that year the legislation defined the £546,000 as being the amount which, immediately before the passing of the Act, the Company were authorized to raise. It drew a distinction between the capital which was to be raised under that Act. This earlier capital gave the 10 per cent. Further, in referring to the original capital, it appeared to the Court to be plain that they were referring to the capital either in the Act of 1811 or the Act of 1855; it was defined as that which, previous to the passing of the Act, the Company had power to raise. Their attention was called to the fact that, in the Companies Clauses Act, 1847, section 57 had a provision with regard to new shares, when the Act was embodied in any Act of the Company, that the capital to be raised by the creation of new shares should be considered as part of the general capital, and should be subject to the same provisions in all respects. It was suggested that this should mean existing capital; but why that should be so, he did not understand. On the contrary, it appeared to him that the Legislature drew a distinction there that it had drawn in the section the Court was construing, between general and original; and for this reason, that if one referred to general capital one would probably be involved in this difficulty, that the general capital might consist of various sums having varying incidence. Therefore, it would be embarrassing. Whereas, if one referred to the original capital, one referred to something which in every case could be ascertained, and the nature and incidence of which could therefore raise no difficulty. Another point had been raised of this kind. It had been said that the Company, having been restricted by the Act of 1855, in regard to part of the capital raised thereby, to 7½ per cent., it was impossible to suppose they should have the 10 per cent. Yet the Legislature might, as it had in many Acts, have defined the amount of capital by a distinct expression, and said it should be 7 or 7½ per cent. But instead of doing this, it had referred to the general capital, which the Legislature knew bore 10 per cent. One other observation required attention. It was suggested that some difficulty was created with that construction by the power given by section 4 to create new shares wholly or partly of ordinary shares or wholly or partly of preferential shares, as the Company should think fit. But, in the opinion of the Court, this created no difficulty Ten per cent. was to be affixed to it whether the whole or part was ordinary capital; and whether the whole or part was entitled to preference made no difference in the rate of interest. The Legislature expressly referred to the original capital; and they could not see any absurdity in construing the words according to their natural meaning, or any reason for departing from that meaning and giving them another meaning. They therefore held that the shares were entitled to 10 per cent.

Mr. MOULTON said he would not make any further remarks in opening the case for the Water Board.

Sir *Alexander Binnie* was then called. He said that the average per head of water supply in nine months of the past year in the Company's district was 36·45 gallons. The Company had been honestly trying to reduce the consumption per head since 1897. The average of 36½ gallons per head was a most favourable one. There had been frequent complaints as to the quality of the water, which was dirty; and the storage was very deficient. If adequate storage were provided, it would involve a large outlay. The future expenditure would, he estimated, be at the rate of 46½ per cent. of the net rental revenue.

In cross-examination by Mr. BALFOUR BROWNE, witness said dirty water could be altered either by subsidence reservoirs or filters. He did not draw the discoloured water, but saw it in the reservoir.

Mr. *Brough Taylor* also gave evidence to the same effect.

Mr. *C. E. Cassill*, Public Analyst for Westminster, said he had analyzed the water of the Company for the last 25 years for the authorities interested. It had been very bad, and of variable quality. In some of it the organic matter was so bad that he had absolutely condemned it as unfit for use. The Thames water was least fit for drinking water when it was in flood. Sir William Crookes and Professor Dewar had frequently confirmed his analytical results; but they had nevertheless drawn different conclusions from himself.

Dr. *Klein* said, from samples he had taken, he did not consider the Grand Junction water safe or satisfactory.

Twenty-Ninth Day—Thursday, Dec. 10.

Sir *A. Binnie* put in tables showing the average daily supply from the Thames from 1893 to 1902 inclusive; the average supply in the month of maximum demand; and estimates of future supply.

Mr. BALFOUR BROWNE put in a table showing the estimated annual cost of the Staines reservoirs to be borne by the Company in the year 1907. According to this, the total interest and expenses would amount to £61,900, of which £20,300 would be the proportion payable by the Company. So soon, however, as they began to use the Staines water, the Company would effect a saving in respect of the pumping of 3200 million gallons hitherto pumped at Hampton. Taking the cost of this at 30s. per million gallons, it would mean a saving of £4800, which would make the real expenditure of the Company in respect of the Staines scheme £15,500, because the Staines water would not require pumping, but would gravitate to London.

Mr. *James Watson*, the Engineer of the Bradford Water-Works, examined by Mr. FREEMAN, said he did not think the Grand Junction Company could rely on further reducing the figure of rather more than 36 gallons to which they had already reduced their supply per head, having regard to the residential character of their district, and the large number of sanitary appliances now used in the class of houses they supplied. In view of the nature of the Thames water, it was imperative that it should go through subsidence reservoirs before being filtered. If the Company at once made use of the Staines reservoirs, they would undoubtedly greatly improve their supply. Tables put in by the Company showed that the cost of each supply was about £4. He should put it at £12.

Mr. *Bevan*, a member of a firm of Chartered Accountants acting for the Water Board, examined by the Hon. J. D. FITZGERALD, handed in a number of tables dealing with the accounts of the Company. These showed that the net profit in 1902 was slightly over £105,000, and that the average dividends for the ten years 1893-1902 were 7½ per cent. His tables differed from the results obtained by the Accountants on the other side in only one respect. The six months immediately after the passing of the Act of 1852 were included in the table relating to the maximum dividends in one case, and not in the other. This showed a difference in back-dividends of £4000; the amount at which the back-dividends were put by the Company being £722,000, whereas his table made it £718,000. The average annual expenditure of the Company, according to one table, in the 20 years ending Sept. 30, 1902, was £30,100; for the ten years ending at the same time, £33,485; and for the five years, also ending at the same time, £33,239.

Mr. *H. E. Haward*, the Comptroller to the London County Council, examined by Mr. FREEMAN, produced a number of tables showing the approximate estimates of the future income and trading profits, charges for interest, sinking fund, &c. The actual figures for the year to Sept. 30, 1903, showed that the net profit earned was £104,263, or £12,887 short of the sum required to pay the maximum dividends. He stated the estimate for the future with the water-rental of £245,297—the actual figure for the year ending Sept. 30, 1903. He assumed that this would increase by £7000 per annum; and he took this figure because it represented rather more than the average increase in the water-rental over the five years ending September, 1902—the actual figure being £6865 per annum. The increase in the last year was £9100; but this appeared to be due to the abnormal development of property in certain districts, and to rebuilding within the County of London. There was no reason to suppose that it would continue. The working expenses he averaged at 46·12 per cent.; but he had not included in this figure any of the special expenditure on the lowering of mains, &c., incurred from 1895 to 1898. Deducting working expenses on this basis, he arrived at a profit on trading of £134,979 for the year 1903-4, increasing to £146,214 in 1906-7—an increase of about £3800 per annum. As to the interest charge, he assumed that £40,000 was issued in 1903-4 to make good the overdrawn balance of £23,156 on capital account on Sept. 30, 1903, and to meet expenditure in 1903-4. The remaining £60,000 of the £100,000 authorized by the Act of 1902 he assumed to be issued at the rate of £20,000 in the years 1904-5, 1905-6, and 1906-7, as against the Company's estimate of £10,000 a year. The latter figure he regarded as obviously too small, in view of the Company's growing business. The allegation that the expenditure on the Staines reservoirs would obviate a certain amount of capital expenditure in the future could only apply to a small extent. The Staines works were of a special character; being designed only to take water at times of flood and store it for subsequent use. In fact, these works took the place of the ordinary intake works of the Company, and did not obviate the necessity of provision by the Company of filter-beds, service reservoirs, engines and machinery for pumping, and all ordinary expenditure, such as mains, meters, &c. He estimated that the interest charge for the year ending Sept. 30, 1904, would be £15,800; for 1905, £16,450; for 1906, £17,100; and for 1907, £17,750. Besides this, the Company had to pay one-third of the expenses of the Staines Reservoirs Joint Committee, which would be £19,250 in 1904, and £21,500 in 1907. The miscellaneous rents and other receipts he put at £700 per annum. Having regard to these figures, he made the total net profits, before deducting for sinking fund, in 1904, £100,629, rising to £107,664 in 1907, 1908, 1909, and 1910. He assumed that the dividends on the 7 per cent. stock would be 7 per cent. in 1904 onwards; and on both the 7½ per cent. and the 10 per cent. maximum stocks, from 7 per cent. in 1904 to 7½ per cent. in 1910. On the basis of dividends at these rates, he calculated that the sinking fund charge would vary from £7793 in 1904 to £11,383 in 1910. The balances available for dividend, after deducting the sinking fund contribution, would vary from £92,836 in 1904 to £96,281 in 1910. Thus the "D" and "C" stocks would receive their maximum dividend of 7 and 7½ per cent. respectively; while the "A" and "B" 10 per cent. maximum stocks would receive a dividend of 7½ per cent. The result of his investigations was that he was led to the conviction that, with the Staines reservoirs liabilities upon them, the Company could not earn enough to pay their maximum dividends in future, and that therefore no question as to back-dividends could arise in this case. In the foregoing estimates, he had taken no account of the effect of the sterilization sections in the Company's Act of 1902 and in the Staines Reservoirs Acts. He calculated the profits to which the sterilization

section of the Act of 1902 would apply would amount in 1904 to £1375, in 1905 to £3400, in 1906 to £4909, in 1907 to £6430, in 1908 to £8595, in 1909 to £8085, and in 1910 to £7575.

Cross-examined by Mr. BALFOUR BROWNE: He thought that 46½ was a fair percentage to allow for working expenses. He assumed that the Company, after expending the £100,000 authorized under the Act of 1902, would be at the end of their resources.

Mr. *J. G. Griffiths*, examined by Mr. MOULTON, stated that, in his opinion, after examining the accounts of the Company for the last twenty years, 1902 was a fair normal year; and therefore the alterations proposed to be made by the Company in the accounts of that year should not be allowed.

This concluded the evidence.

Mr. FLETCHER MOULTON then addressed the Court on behalf of the Water Board, urging very strongly that the Company could not, having taken power from Parliament to store its water at Staines, refuse to use that power in order to avoid a payment which it accepted as a condition of obtaining the water. He asked the Court consequently to put the date of the commencement of the operation of the sinking fund in respect of the Staines reservoirs in the immediate future; and he pointed out that the legal requirement in regard to the matter was satisfied when the Staines Reservoirs (as was the case at present) held water ready to be used as occasion arose, because then the reservoir would be doing what it was intended to do—viz., be a resource should the Company want additional water. The Court he submitted should assume that the Company would use all the powers it possessed for the purpose of giving pure and potable water; the Court should not assume that a Company that obtained powers with regard to the Staines reservoirs in the way in which this Company obtained them, was not under an obligation to use all its powers to improve the supply. The evidence was entirely one way as to the turbidity of the Thames at times of flood; and the evidence showed further that bacteria of human origin was contained in the water supplied by the Company. Therefore, the Company ought to use storage if it possessed it; and as the Company did possess storage at Staines, the Court should decide that, if the purchase had not taken place, the Company would have used that storage so as to avoid the continuous complaints that were made as to the quality of the water. There were abundant danger signals which ought to make the Companies take every precaution they could adopt. He had no wish, he added, to attack this water otherwise than to show that it was water with which they ought to be careful. Even if they did not at once take water from the Staines reservoirs because of the quality of the present supply, he contended that they would, because of the increased consumption, be compelled to take it.

Mr. *F. H. Wybroo*, the Secretary to the Staines Reservoirs Joint Committee, was called at this point to produce a minute drawn up by Sir John Hollams in regard to a meeting, on July 15, 1896, of the Chairmen of the New River, West Middlesex, and Grand Junction Companies, under which, with reference to the payment of £5000 per annum to the Conservators of the Thames, under the provisions of the then pending Bill, it was arranged that the New River Company should contribute £2000 per annum, and that the remaining £3000 should be dealt with as part of the expenses of the Joint Committee, to which all three Companies contributed.

Mr. FLETCHER MOULTON: This is most extraordinary. Has any agreement ever been drawn up between the Companies?

Witness: No.

Simply a minute arranged between the three Chairmen?—Yes.

Mr. MOULTON: The New River Company has an extra burden on its shoulders, and we never heard anything about it.

Mr. BALFOUR BROWNE: I appeared for the New River Company, and I knew nothing about it. Of course, it is a debit to the New River Company, if it is a credit to the Grand Junction Company.

Mr. MOULTON said he should not take the minute as being binding on the Companies. Proceeding, he referred in detail to the figures of Mr. Haward's tables, which he explained and elaborated; and, with regard to the sterilization clauses—which he described as "unquestionably drastic legislation"—he pressed the Court to decide that full and fair effect should be given to them, whatever that effect might be.

Thirtieth Day—Friday, Dec. 11.

An amended table was put in by Counsel for the Water Board, showing that, even if £3200 was saved annually in pumping at Hampton after the Staines supply was utilized, the maximum dividend of 10 per cent. could not be earned by the Company.

Mr. BALFOUR BROWNE, in summing up the claim for the Company, said he had to complain that the Water Board had put in no tables indicating the value of the Company's works, but had contented themselves with throwing a good deal of mud and suggesting a number of criticisms. The Company, however, had attempted to show what was the result of all the calculations which had to be made on one side or the other to enable the Arbitrators to come to a true conclusion as to the value of the undertaking. It would be a monstrous thing if the Company were punished to the extent of £55,000 out of pocket in respect of the Staines reservoirs, and of £12,000 a year, merely to provide these reservoirs for the Water Board at less than cost price. The Board had failed to prove the necessity of using storage reservoirs, and had not disproved the Company's assertion that they would not require the Staines supply before 1915. The latest report of the Local Government Board's Examiner showed that the water supplied by the Companies possessing storage was not so good as the Grand Junction water. Sir William Crookes and Professor Dewar stated that the Company supplied a perfectly good and potable water; and if there was nothing deleterious in the water, why should they have recourse to the Staines supply? If they ought not to be compelled to do so, the Staines expenditure was unproductive capital, and the Company would not have to be bear the burden of the sinking fund. He contended that every point against the Company had been strained by Mr. Haward in his figures. In conclusion, the learned Counsel remarked that there were several matters upon which it might be necessary for him to ask that an appeal should be allowed.

Thirty-First Day—Tuesday, Dec. 15.

The PRESIDENT this morning gave the judgment of the Court as to the sinking fund in the Grand Junction Company's case. In the course of it, he said the question to be decided arose under section 81 of the Staines Reservoirs Act, 1896. By this section, it was enacted that each of the three Companies should in the first half year in which water was obtained by means of the works by the Act authorized, and at the end of successive half years, make successive payments to the Chamberlain's Fund. The question for decision was what was the meaning of the expression "first obtained by means of the works by this Act authorized." On the one hand, it was contended it meant the obtaining of the water by the Staines Joint Committee; on the other, it was said that it meant the obtaining of the water from the reservoirs and works by each Company separately. The consequence was the two views were these: That if the obtaining was by the Joint Committee, every Company would have to pay when the operation took place. On the other hand, it was contended that each Company only paid when it took water for its own purposes from these joint reservoirs. They were of opinion that the obtaining of the water was the obtaining by the Joint Committee. Now, in the first place, it was to be observed that the scheme of the statute was the creation of an independent Company or undertaking for the purpose of taking water from the River Thames. It was not three undertakings joined together in any fashion; it was one undertaking in respect to which the Companies were more or less contributory. In the next place, it was to be observed that section 55 dealt with the taking of water; and it provided that, subject to certain conditions, the Joint Committee might, by means of works by the Act authorized, collect and obtain water from the River Thames. In their opinion, the obtaining of the water by means of works authorized by the Act referred to in section 81 was the same as was described in section 55 as the collection and obtaining of water by the Joint Committee. Further, it was to be observed that—when one came to the mode in which the Act dealt with the rights—each of the several Companies could obtain water from a common stock. It provided that the Companies should be entitled to, and have delivery to them of, the water at the time being taken from the aqueduct. Therefore the scheme of the Act was that the water was to be obtained from the Thames by joint enterprise; it was to be delivered by the joint enterprise to the several Companies. A further confirmation seemed to be drawn from section 83. This provided for the payment by each Company of a certain share of the undertaking when no operations were going on. So that, if the New River Company were to begin operations now, and the Grand Junction Company at a later date, the Grand Junction Company would confessedly be liable to the sums payable in respect to the working of the joint enterprise. Therefore, in their view, the expenses and the sinking fund all arose when the joint enterprise was entered upon. The Court would, therefore, make a declaration to this effect. He was to add that, as far as they were at present advised—they had not yet heard the application of the West Middlesex Company—they thought that the Companies could have taken water at or about the same date, and therefore, in their minds, the decision they had arrived at was not one of great importance.

Mr. BOYLE said the representatives of the Grand Junction Company would like to have an opportunity of considering the decision.

The award was given yesterday (Monday), see p. 763.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Offices, Southwark Bridge Road, last Tuesday—Alderman Sir H. E. KNIGHT in the chair.

The SECRETARY (Mr. Montague Watts) having read the notice convening the meeting, the report and accounts were presented.

The CHAIRMAN reminded the proprietors that for the last two half years the accounts had not been signed by the Official Auditor (Mr. Allen Stoneham), with whom there had been a difference respecting the allocation of a certain amount connected with the expense of opposing the Act of 1902. The accounts were therefore only signed at the time by the Company's own Auditors; but, as the result of negotiations, he was happy to state that Mr. Stoneham had at last signed the accounts for the two half years, and had also appended his certificate to those for the half year ended Sept. 30 last. What the Directors had all along urged as the proper thing to do, the Official Auditor had consented to, and he had allowed the items in question to remain in suspense, and to be decided by the Court of Arbitration, according to the Act of 1902. The Chairman then proposed the adoption of the accounts for the half years ended Sept. 30, 1902, and March 31, 1903, as certified by the Official Auditor.

Mr. C. M. VIALLS seconded the motion; and it was carried.

The CHAIRMAN next proposed the adoption of the report and accounts to Sept. 30 last; remarking that the Directors had been able to place before the proprietors a most satisfactory condition of things. Before finishing the few remarks he had to make, he believed that they would be thoroughly satisfied with the soundness and stability of the Company's undertaking. Dealing with the principal items in the revenue account, he stated that as regarded the expenses of maintenance and repair of mains, &c., they amounted for the past half year to £12,777, or an increase of £1274 on the figures of the corresponding period of 1902. In pursuance of their arrangements with the other Companies, and in carrying out the intercommunication works, one of the conditions was that the latter were to take over this Company's 36-inch main, which had been used for conveying unfiltered water to London; and the Company had received in exchange a new 36-inch main for the conveyance of filtered water to the Metropolis. It was necessary for the Company to cleanse the main, which had been used for unfiltered water; and this work had involved a charge of about £2000. But for this, the charges for maintenance and repair of mains, &c., would have shown a decrease instead of the increase of £1274 he had mentioned. Pumping and engine charges had been £14,401—being a saving of no

less than £4648; and there was also a saving of £3118 in rates and taxes. Some time ago he stated that when the Company could discontinue the use of the Battersea works, they would save about £10,000 a year. The use of the works was discontinued in the past six months, and the result was the reduction of £4648 he had mentioned; the saving in rates and taxes being, of course, due to the fact that the Battersea works, having been acquired by the Intercommunication Committee, had been taken off the Company's rateable value. The two items in question amounted to no less than £7766; but against this there was the cost he had mentioned for cleaning the main which had been transferred, as well as one or two smaller increases—these items amounting altogether to £2413. The net saving, therefore, in the maintenance charges was £5353. On the other side of the account, the water-rents accrued amounted this half year to £153,808; showing a decrease, as compared with the figures of the September half of 1902, of £6700. But in the corresponding period of last year, the Company received £8835 for water supplied to the East London Company; whereas in the past year they had not supplied the Company with any water. Deducting from the £8835 the £6700, it would be seen that the water-rents accrued this half year really showed an increase of £2135. The amount transferred to dividend and interest acccount was £83,751, out of which interest, debenture stock interest, and dividend on the preference stock had been paid and provision made for interest accrued to Sept. 30 last. On the other hand, the balance brought forward, after deducting the dividend paid from it, was taken into account, and the amount available for distribution was £39,274. Out of this, the Directors proposed to pay a dividend of 7½ per cent. per annum (the same as in the previous half year), leaving £698 to be carried forward. They would have liked to carry forward a larger amount; but they hoped it would be sufficient—and they saw no reason why it should not be—in view of the saving which would be effected in the current half year from the closing of the Battersea works. Passing to the report, he stated that the increase in the number of the Company's new supplies was 788, which were estimated to produce an additional annual rental of £1708. The increase in the meter rates was equally satisfactory; and this item now formed a very important one. In fact, going back ten or twelve years, there had been a regular and steady increase in the revenue both from the domestic supplies and the meters—a fact showing the vitality and soundness of the undertaking. Another item which was no less satisfactory was the receipts per house. In former years, he had pointed out that the receipts per house were exceedingly small—almost smaller, he thought, than in the case of any other Company. But the steady progress in this item showed that the new houses which had been erected in the Company's district were of a more paying character to them. The clause of the report relating to the arbitration was an important one, and it was one which the Directors had placed before the proprietors in as clear and concise a manner as circumstances had permitted them to do. It would be readily understood that it would not be in the proprietors' interests, or in good taste on his part, if he were to express any opinion on a subject which was now *sub judice*. The inquiry before the Arbitrators was being conducted in the keenest possible manner; and circumstances connected with the Water Companies which in the ordinary way would never have struck anyone were being discussed. All these matters, however, had been so far fairly considered and argued, and their importance was evident when the number of points on which it would be necessary to go to the Court of Appeal was borne in mind. The preparation of the Company's case had involved considerable time and labour; and a vast amount of service had been required from their principal officers—service which had been rendered most ungrudgingly. He specially called attention to this matter because the Directors felt that a fair reward was due to these gentlemen, whom they proposed to remunerate in a manner which he was quite sure the proprietors would approve of. The Battersea works were conveyed to the Intercommunication Committee on March 31 last, and he had explained the saving which the Company would thus effect. The Directors had agreed to lease to the Committee one set of the Company's engine-houses at Hampton; and though the lease had not yet been perfected—and he did not know that this was necessary, in view of the approaching transfer—everything was complete, so that the intercommunication works might be available if they were ever required. The Company would never want them—their future needs having been so fully arranged for. But it was thought advisable for them to join the other Companies in providing an assurance against the possibility of any failure in the supply of London. The Chairman concluded by referring with great regret to the death of Mr. Noel Whiting, who had been a Director of the Company for many years.

Mr. VIALLS seconded the motion, which was unanimously carried.

Resolutions were afterwards passed declaring the dividends recommended, and re-electing the retiring Directors (Mr. Vialls, Viscount Duncannon, C.V.O., C.B., and the Right Hon. C. B. S. Wortley, K C., M.P.), and the retiring Auditor (Mr. S. P. Child).

A vote of thanks to the Chairman and Directors terminated the proceedings.

CHELSEA WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Offices, Commercial Road, Pimlico, on Thursday last, under the presidency of Mr. FRANCIS STEPHEN CLAYTON.

The SECRETARY (Mr. G. H. Gill) read the notice convening the meeting, and after the disposal of some formal business,

The GOVERNOR proposed the adoption of the report. The accounts for the half year ended Sept. 30 last were, he said, highly satisfactory, and amply justified the Directors in recommending a dividend at the rate of 12 per cent. on the ordinary stock, instead of 11½ per cent. as for the previous half year. This was after paying and providing for the debenture stock interest and the preference stock dividend; and £39,719 remained to be carried forward. The expenditure on capital account during the half year had been £503, which had been incurred chiefly in connection with domestic and meter supplies. There had been an increase in the net revenue for the half year of £2851, as compared with that of the corresponding period of 1902; but this included £224, the premium received on the sale of £110 of preference convertible stock—a small amount which had remained unissued, and which the Directors had thought it desirable to clear off. It also included £352, being the proportion of dividend payable by the Associated Water Companies on the debenture stock raised by this Company under the Intercommunication Act of 1899. The quantity of water pumped for all purposes during the half year was 2241 million gallons, which was practically the same as in the corresponding period of last year. In this connection, he might say, by way of explanation, that, while the meter supplies showed an increased consumption of 5½ million gallons, there had been, on the other hand, a considerable saving of waste—about 9 million gallons—during the half year in the districts under Deacon's waste-water system. About 53 per cent. of the Company's supplies were now under that system. During the half year, 225 yards of service mains were laid, and 266 domestic and meter supplies were connected. After allowing for the temporary loss of income from houses pulled down for improvements, these new supplies were estimated to produce an increased rental of £1710 per annum. The Engineer reported that the machinery and plant were in good repair. The Court of Arbitration had already disposed of the case of the East London Company. The New River and Grand Junction Companies had also been dealt with; and the West Middlesex case was now being heard. Their own case was seventh on the list. The Chelsea Company, of course, differed in some respects from the other Companies. For instance, he believed that they stood alone in having power to take more water from the Thames than they would probably require. They had power to take 22 million gallons daily; while there was good reason to believe that no more than 17 millions would be required for 15 or 20 years to come, and it was highly improbable that the maximum of 22 million gallons would ever be required. Again, the Water Board, in their answer to the Company's claim, had admitted that the latter possessed machinery and plant sufficient for a daily supply of 17 million gallons. This was an important admission, because, as he had said, the maximum supply of the Company was not likely to exceed 17 million gallons; while the present daily average was about 12 millions only. It was therefore obvious that any further expenditure for additional plant and machinery should be comparatively slight. For some time past, they had received a considerable increase of revenue from the pulling down of old houses in Westminster and Chelsea for improvements; and the process of transition was still in progress. The Directors had reason to know that several building schemes were in preparation, which would be carried out in the near future. Their experience of these improvements was that, while the number of supplies was reduced—several small houses being usually replaced by one large building—the water-rates were nevertheless four, five, and sometimes six fold. Another valuable asset was the undeveloped part of the Company's district, consisting of about 200 acres, in Fulham. This was in course of rapid development; and it would ultimately yield about £6000 per annum in water-rates. Again, the meter supplies were continually increasing. It would interest the proprietors to know that the Company were entirely unrestricted in the amount of their charge for supplies other than domestic. The amounts charged for supplies by meter had always been on an exceedingly moderate scale. Recently, however—owing to the great increase of rates and taxes, and in the cost of coals, wages, and materials—several of the old agreements had been determined, and fresh ones had been entered into on a scale more favourable to the Company. This process was still going on; and it would be their policy to extend it up to "the appointed day." In fact, for some time past all new supplies had been afforded on the higher scale. Moreover, the Directors could at any time they thought fit exact a much larger revenue from this source, as there was practically no limit to the charge which might be made—subject, of course, to agreement. Bearing all this in mind, the Board considered that the Company were in a thoroughly sound financial position. They were now paying a dividend at the rate of 12 per cent. on the ordinary stock, and, in addition, upwards of £1,000,000 was due for back dividends, the present value of which should be a considerable ingredient in the amount of compensation to be awarded to the Company by the Court of Arbitration. From these considerations, the Directors had good ground for believing that they would show an excellent case before the Court, and that it should result most satisfactorily to the interests of the proprietors.

The DEPUTY-GOVERNOR (Mr. Jackson Hunt) seconded the motion.

The GOVERNOR, in answer to Mr. Drew, stated that the back dividends dated from 1852. In reply to Mr. Crozier, he stated that although "the appointed day" was fixed for June 24 next, it was open to the Company to have another meeting. The next half-year's dividend would be paid by the Company, and not by another body. He then put the motion, which was unanimously adopted. A resolution was afterwards passed authorizing the payment of the dividends recommended.

On the motion of Mr. DREW, seconded by Mr. G. GIBBS, a cordial vote of thanks was passed to the Governor and the Directors for their services to the Company, the sound position of which was referred to with much satisfaction by Mr. Drew.

The GOVERNOR, in acknowledging the vote, observed that the present was a time full of anxiety for the Directors; but the proprietors might rest assured that the Board would do their utmost in the Company's interest. They would have invaluable assistance from the Secretary and staft. They also had a very able Solicitor, Sir John Hollams; and he and the Company would be represented before the Court of Arbitration by three singularly able Counsel.

A vote of thanks was afterwards passed to the Secretary, the Assistant-Secretary (Mr. Harrison), and the officers of the Company.

The SECRETARY, in reply, referred in warm terms to the services which had been rendered to the Company by the Assistant-Secretary; observing that Mr. Harrison had been of immense assistance in the past half year, not only in preparing the Company's claim, but also in getting out the complicated tables and figures for the expert witnesses.

The proceedings then terminated.

LONDON COUNTY COUNCIL AND GAS-TESTING.

In connection with the proceedings in the Court of Appeal reported in last week's issue of the "JOURNAL," it may be of interest to give some extracts from the recently issued report of the proceedings of the London County Council in the year ending the 31st of March last, showing the results of the tests carried out by their Examiners, under the superintendence of Dr. Frank Clowes, F.I.C., the Chief Chemist, of the gas supplied in the Metropolis during that period.

The average illuminating power of the gas, as shown by the daily tests made at the official testing-places during the year, was as follows—

Company.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Average.
	Candles.	Candles.	Candles.	Candles.	Candles.
Gaslight and Coke .	16·5	16·5	16·4	16 6	16·5
South Metropolitan	15·1	15·0	14 8	14·9	15·0
Commercial . . .	16·8	16·6	16·6	..	16·7
,, . .	..	..	..	15·2	15·2

Note.—The Gaslight and Coke Company's standard is 16 candles; that of the South Metropolitan Company, 14 candles. That of the Commercial Company was 16 candles till Dec. 31, 1902; afterwards 14 candles.

The following table shows the results of tests (201 in all) made with the portable photometer during the year :—

Tests Showing Illuminating Power of the Gas to be—	Gaslight and Coke Company.		South Metropolitan Gas Company.		Commercial Gas Company.	
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)
Above 16 candles	49	67	..	..	10	36
Between 15·5 and 16·0. . . .	19	25	..	..	13	46
,, 15·0 ,, 15·5. . . .	5	7	..	..	4	14
,, 14·0 ,, 15·0 . . .	1	1	..	..	1	4
Above 14 candles	..	..	51	52	..	..
Between 13·5 and 14·0 . . .	..	..	33	33	..	..
,, 13·0 ,, 13·5 . . .	..	..	12	12	..	..
,, 12·5 ,, 13·0 . . .	..	..	3	3	..	..
	74		99		28	
	Average, 16·22 candles.		Average, 14·26 candles.		Average, 15·93 candles.	

(*a*) Number of tests; (*b*) approximate percentage of the whole.

It will be noticed that the results of the tests continue to be far more satisfactory than those obtained in previous years, and show the usefulness of the Council's efforts to make the tests with the portable photometer binding on the Gas Companies.

The average amounts of sulphur in grains per 100 cubic feet of gas were as follows; the maximum allowed during the first and second quarters having been 17 grains, and during the third and fourth quarters 22 grains :—

Company.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Average.
Gaslight and Coke .	10·9	10·8	10·6	11·7	11·0
South Metropolitan	12·2	10·2	12·0	13·0	11 8
Commercial . . .	8·5	7·3	9·6	8·9	8 6

There were ten cases of deficient illuminating power, eight cases of the presence of sulphuretted hydrogen, and one case of deficient pressure, but no cases of excess of sulphur or ammonia during the year. The following table shows the position of the cases which have occurred : —

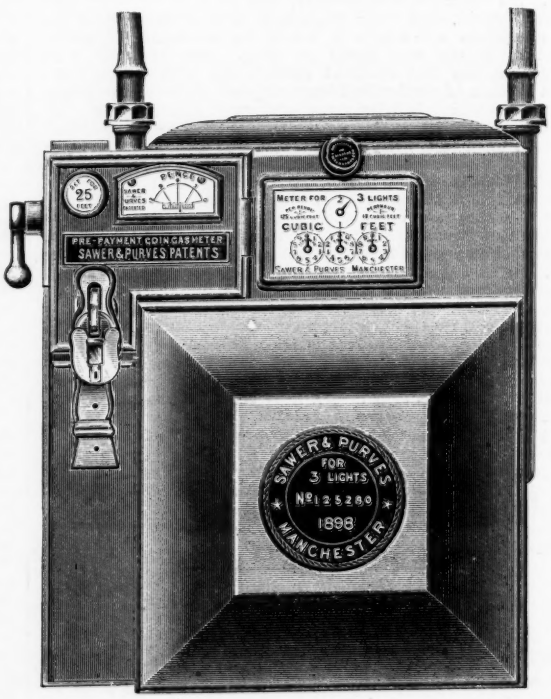
Company.	Cases of Deficient Illuminating Power.	Cases of Sulphuretted Hydrogen.	Cases of Deficient Pressure.
Commercial	† 1	* 6	* 1
Gaslight and Coke	* 2	..	..
	† 4	..	..
	‡ 3	..	..
South Metropolitan . . .	..	* 2	..

* Appeals allowed. † Forfeitures. ‡ Sunday tests—decision reserved.

Reduction in Price at Walsall.—The Walsall Corporation Gas Committee intimate that the result of the working of the undertaking during the current year justifies them in recommending that from Jan. 1 the price of gas, both for lighting and manufacturing purposes, be reduced 3d. per 1000 cubic feet, with a discount of 2½ per cent., as hitherto, for payment within one month. The charge to ordinary consumers will then be 2s. 6d., and for manufacturing purposes 2s. 3d. per 1000 cubic feet.

Incandescent Gas Lighting in Spain.—The fact that incandescent gas-burners give four or five times more light than ordinary burners for a like consumption of gas has not made so deep an impression in Spain, and especially in Madrid, as in other parts of the world. The "Revista Minera" says that one of the difficulties in the city is the price of mantles, which is higher there than elsewhere. It is a case of buying inferior kinds, or paying considerably more for serviceable articles than they cost in other countries.

THE ABOVE REPRESENTS THE SIZE OF OUR BUSINESS WHEN THE "POSITIVE" SLOT METER WAS FIRST MADE IN 1889



SAWER & PURVES,

MANCHESTER
AND
NOTTINGHAM.

IT HAS INCREASED IN RATIO TO THE ABOVE, SINCE THE POPULARITY AND PRE-EMINENCE OF THE "POSITIVE" SLOT METER BECAME PRONOUNCED.

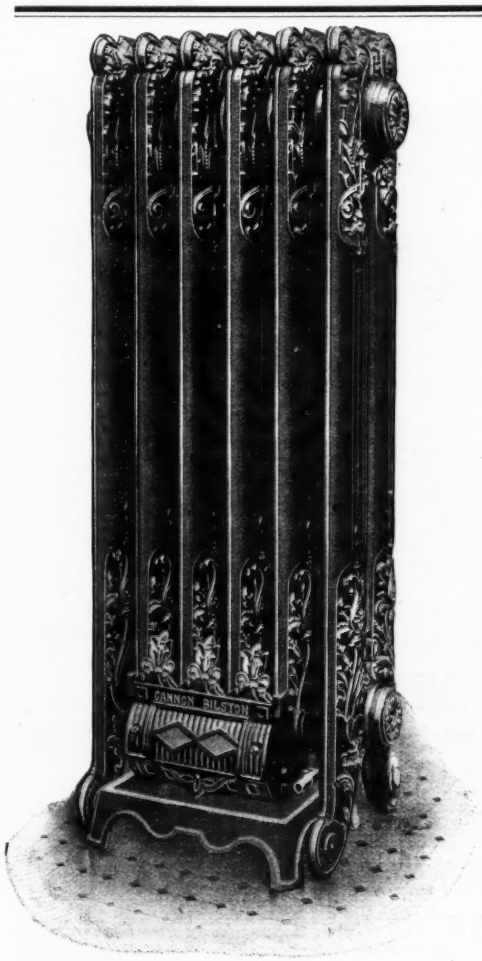
INCANDESCENT GAS-LAMPS AT SOUTHAMPTON.

The Southampton Borough Council, at their last meeting, considered a recommendation of the Highways and Lighting Sub-Committee that provision be made in the next year's estimate to fit incandescent gas-burners to the whole of the lamps in the borough. The Engineer reported that 441 out of a total number of 1584 lamps had up to the present time been so fitted, and that he calculated the cost of converting the remainder at £629. Mr. Blakeway complained of the condition of some of the mantles, and said the light given was anything but an improvement. He asked what the cost of maintenance was, whether there was any saving of gas, and on what basis the payment was arranged. He would like to see a proper report brought up on these matters before they committed themselves to a wholesale system of incandescent gas lighting, and suggested that they should extend the use of electricity. Mr. Tebbutt spoke of the advantages of incandescent gas lighting, but thought it would be unwise to force the Committee to put up such burners where there was no need for them. He proposed, as an amendment, that incandescent burners should be fitted where the Highways Committee considered they were required. Mr. Bicker-Caarten said they must have the best lighting possible; and as electricity was not at present within the range of practical politics, they must have incandescent gas. The amendment was lost; and the recommendation of the Sub-Committee was afterwards carried, with the addition of the words "subject to the approval of the Finance Committee."

PUBLIC LIGHTING OF ABINGDON.

At the Meeting of the Abingdon Town Council last Wednesday, a report by the Public Lighting Committee was read which contained recommendations as to the terms for a new contract with the Gas Company for lighting the street-lamps. At present, there are 67 "A" lamps lit an hour after sunset, and remaining alight until an hour before sunrise each day throughout the year; being a total number of 4355 hours per lamp. There are also 99 "B" lamps, which are lit an hour after sunset and extinguished at midnight, excepting for three nights before and three nights after full moon, or a total of 1846 hours per lamp per annum. Each lamp with its bye-pass burns 4 cubic feet per hour; and the price during the first portion of last year was at the rate of 4s. 3d. per 1000 cubic feet, and during the last half year 4s. The total expenditure last year was £546. As many complaints have been received of the unsatisfactory lighting of certain portions of the town during the time that the "B" lamps are not lit, or when the light of the moon is obscured, the Committee considered that the opportunity should be taken to alter the system of lighting, so as to obviate this admitted defect. They therefore recommended the Council to adopt a third class of lamps, to be called "C" lamps, to be lit (say) an hour after sunset, and extinguished at midnight all the year round. By adopting this course, a certain number of "B" lamps can be improved to "C" lamps, and a certain number of "A" lamps can be reduced to "C" lamps. The general principle adopted by the Committee has been to retain an "A" lamp at all street corners at the various entrances to the town, and opposite such courts as seem to need this extra lighting, and to distribute the "B" and "C" lamps in such a way as to secure a certain amount of light during the six nights in each month previously referred to. Estimates have been obtained from the Gas Company for supplying gas, providing mantles, renewing burners, and lighting, extinguishing, and cleaning lamps, and repairing and painting lanterns and columns, for an inclusive charge of £4 8s. for "A" lamps, £2 8s. for "B" lamps, and £2 16s. for "C" lamps. The adoption of these recommendations would result in a saving, compared with last year's expenditure, of about £50. The Committee thought the scheme would give a much better lighted town before midnight, with a sufficient number of lamps burning after that time to meet the necessities of the police and through night traffic; and in order to simplify and check the lighting, the Committee recommended that the Borough Surveyor be instructed to paint the letters "A," "B," and "C" on the glass of the lamps. The burner selected by the Committee is the No. 3 Kern, which consumes about 20 per cent. more gas than those that are now in use in the town, but gives 50 per cent. more light. The Gas Company stipulate that if they are to pay for renewing burners under the new contract, the Council should, in the first instance, provide a complete set of new burners; and as the Company are willing to supply the extra quantity of gas without any charge, the Committee advised that this should be done. The cost of the new burners will be 3s. 9d. per lamp, or a total of £31 2s. 6d., which the Committee recommended should be spread over four quarters of the year. This expenditure will, of course, reduce the above-mentioned saving on the first year; but the Committee considered that the advantage would be so great as to warrant the outlay. The Committee recommended that the new contract should be for three years from the 25th of March next, when the present contract expires. The Mayor moved the adoption of the report, and congratulated the Committee on the prospect of improved lighting at less cost. A short discussion took place as to whether the agreement with the Gas Company should be for one year or for three years as recommended by the Committee. Eventually the three years' agreement was decided upon, and the report was adopted.

Messrs. Joseph Taylor and Co., of Bolton, have received an order from the Hawick Gas Company for a 1½-inch solid-plate lead saturator, fitted with double detachable ammonia pipes and detachable acid pipe, &c. This is in connection with a new sulphate of ammonia plant about to be erected by the Company.



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FATALITY IN A WELSH GAS-WORKS.

Manager and Stoker Asphyxiated.

On Sunday, the 13th inst., an accident occurred at the Penrhiwceiber Gas-Works, which unhappily resulted in the death of the Manager (Mr. Rawlings) and one of the stokers, and jeopardized the life of an assistant named Francis. The works are the property of the Mountain Ash Urban District Council, and are situated in their area; having been removed, after their transfer from the old Company, from Mountain Ash to a lower level. On the above-named day, Mr. Rawlings was attending the purifiers, and had gone to one of the valves to allow the ammoniacal liquor to drain out from the trap. This having been done, he was unable to close the plug, and the gas escaped. He then tried to get out. Pulling himself through the opening, he fell back—the effect of the gas overpowering him. He fell with his face on the tar in a trough. Francis, who was working with him, got in, and, raising him from the tar, found he too was becoming overpowered. He called for aid; and Tansey, the stoker, at once went in to the rescue. He got Mr. Rawlings on his feet, and Francis tried to pull him out, but was too weak to do so. Mr. Rawlings fell back upon Tansey, and Francis then rushed to the unplugged hole, whence gas was still escaping, and with the aid of some waste stopped it, and also the engine, and sent another man for help. Meanwhile Mrs. Rawlings had arrived on the spot, and did all she could to reach her husband and Tansey, but in vain. Others tried to help them by dropping a piece of rope down; but the unfortunate men were too weak to catch hold of it. Joseph Howells, a young collier, hearing someone cry out, rushed to the spot, got to the men, grasped them both, one after the other, with the help of Mrs. Rawlings, and pushed them out. They were then utterly unconscious. In a few moments a medical man arrived, and tried every means in his power to revive them. He telephoned in various directions for oxygen, which, however, only arrived on Monday; and, in spite of all his efforts, Tansey died shortly before six o'clock on Monday evening. Mr. Rawlings remained for some time in a precarious condition—pneumonia as well as bronchitis having set in—and eventually succumbed on Tuesday morning. He was appointed Resident Manager of the works three years ago, and on the morning of his death was to have attended before the District Council as a candidate for the position of their Gas Manager at Mountain Ash.

The following statements in regard to the fatality were made to representatives of a local paper by the survivor and the young collier who bravely went to the rescue of the sufferers: Francis said: "I was outside the manhole watching Rawlings fixing a plug in the tank, when he staggered. I jumped into the tank, and lifted him out on to some pipes; but before I could get out I was overpowered. I had strength enough to call for help; and a stoker named Tansey, seeing my condition, jumped into the tank. He lifted Rawlings off the pipes; but Rawlings fell back again, knocking Tansey over. Tansey then became unconscious. I had enough strength to jump down and put some waste in the hole through which the gas was escaping. I struggled across with difficulty to the engine and stopped it, cutting off the current of gas. A few men, among whom was Howells, then came up. Howells jumped down and lifted Rawlings and Tansey out. I do not remember anything else." Howells gave the following account of the occurrence: He was near his house when he saw some men running towards the police-station. He walked in the direction of the gas-works, and on the way met a man who was running for a doctor. When asked what was the matter, he shouted, "There are two men dying in the gas." Howells then ran down, and saw Mrs. Rawlings, who was crying out, "They are dying inside." He at once took off his coats, and seeing a man at the opening throwing down a piece of rope with a loop on it trying to get at them, he pushed him aside and jumped in at once, picked up the men, and got them out. There was still a lot of gas there, but, he supposed, not so much as at first. He, however, felt the effects of it badly, and could hardly walk on Monday afternoon.

An inquiry into the circumstances under which the fatality above referred to occurred, was held on Wednesday by Mr. R. J. Rhys, the Coroner for the district; Mr. A. Wolfe, one of His Majesty's Inspectors of Factories, being in attendance, and Mr. H. P. Linton, the Clerk to the Mountain Ash District Council, representing that body. Evidence of identification having been given, George Francis, the stoker (who was still suffering from the effects of the gas he had inhaled) described his attempt to rescue Rawlings from the tar-tank. Being unable to get him out, he called Tansey, who entered the tank and became overpowered. Witness succeeded in stopping the escape of gas by filling the hole from which Mr. Rawlings had removed the plug. To get into the tank, one had to step first on to the valve and then on to the floor. The depth was about a yard, and there was no ladder by which to descend. John Murray, another stoker, deposed that he tried to get Tansey out and failed. Finding he was becoming overpowered, he ran for help. Howells, the collier, was the next witness. He described how, with the assistance of Mrs. Rawlings, he was able to get out both of the men, who were unconscious. The gas was very strong, and he felt it was affecting him. He therefore thought it safer not to descend into the tank; but by leaning over he just managed to reach the men. The Coroner complimented the witness on keeping his presence of mind, and said he deserved to be commended. Mr. W. G. Thomas, the Surveyor to the District Council, and Manager of the gas and water works, said Mr. Rawlings had been Resident Manager of the works for the past seven or eight years. The accident occurred in the purifier. When they were working at high pressure, as they did in the winter, some of the gas condensed more rapidly in the valve, and liquor formed, which it was necessary to drain off. It would be Mr. Rawlings' duty to attend to this, and in doing so he would first step on to the valve, about a foot down, then on to an 8-inch pipe about 2 feet lower, and from there he would pull out the

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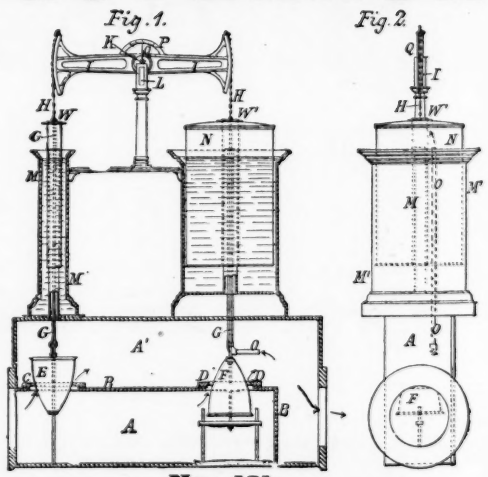

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plug. In about half-a-minute the whole of the liquor would run out, and no gas would come until all the liquor had drained. Mr. Rawlings had to do this work twice, and sometimes three times, a week. There were no fumes from the liquor. There would be a slight smell of gas, but nothing to overpower a man. In answer to the Inspector, witness said that if the plug were below the valve, it would be more dangerous, as the men would have to stoop to get underneath. Replying to other questions, he said a valve would take longer to close than a screw-plug, while plugs such as the one in use had always worked well. He had never before heard of anyone being overcome with gas at the plug. Dr. R. W. Jones, who had attended the deceased, said Tansey never recovered consciousness, and the cause of his death was asphyxia through inhaling coal gas. Mr. Rawlings improved towards evening on the day of the accident, and on the following morning he could articulate. He had, however, swallowed some tar, and his lungs became congested owing to the irritation from it. He died from poisoning by coal gas and the swallowing of the tar. Had he not done this, he might have got well, as he seemed to be making a recovery from the effects of the gas. The Coroner, addressing the Jury, said the first cause of the accident was the overpowering of Mr. Rawlings by gas while doing his work; and Tansey met his death in trying to rescue the Manager. A verdict of "Accidental death" was returned.

THE MARYLEBONE ELECTRIC LIGHTING MUDDLE.

The Council's Bankers Come to the Rescue.

A Special Meeting of the Marylebone Borough Council was held last Thursday—the MAYOR (the Rev. H. Russell Wakefield) presiding—"to consider the judgment of Mr. Justice Buckley in the Council's recent application for an extension of time in which to complete the purchase of the undertaking of the Metropolitan Electric Supply Company, Limited, in the borough, by which it is ordered that the Council are to pay the Company £60,000 by Jan. 31 next" (*ante*, p. 697).

The MAYOR said the Council had been summoned to consider a matter of very grave importance to the borough. With regard to any action taken since they became aware of the judgment, two things had been done. The Counsel engaged in their case had considered the possibility of appeal, and had strongly advised against anything of that sort. The matter was in the discretion of the Judge, who had granted them an indulgence in giving them the extension. He had next seen the Council's bankers, and the interview had been entirely satisfactory. They were prepared to help them to avoid the necessity of any immediate demand for a rate. With regard to the public meeting to be held preparatory to the poll on the Bill, he hoped the people of Marylebone, whether within or outside the Council, would carefully consider the present position—one of the greatest crises in their history—and do their best to work for the good of the borough as a whole. He added, in answer to a question, that a consultation had taken place between the representatives of the Council and the Directors of the Electric Supply Company, but that it was impossible yet to present anything in the shape of a report.

Dr. W. LEAF, the Chairman of the Finance Committee, brought up a long report dealing with the judgment of Mr. Justice Buckley, and recommending the Council to comply with the order of the Court by taking advantage of the arrangement with their bankers referred to by the Mayor, and at the usual and proper time to consider the desirability of raising any amount required in this connection in the next half-yearly rate. In moving concurrence with the recommendation, he said his first impression had been that it would be best to levy a special rate at once; but he now thought they were not justified in doing this, as it would be very hard upon the ratepayers. Besides, he was informed by the Accountant and the Town Clerk (Mr. J. Wilson) that it would be impossible to get the money in by rate in time to pay the amount of the judgment by the end of January.

Colonel HOPKINS seconded the motion.

Mr. G. J. ELGOOD (ex-Mayor) asked if it would be legal for the Council to get the money from their bankers without making the rate in the usual way.

The TOWN CLERK said the orderly way would be to get the sanction of the proper authority and levy the rate; but the present case was one of emergency, and the Council would not be wrong in taking advantage of the opportunity of temporarily raising the loan.

Mr. E. WHITE said he agreed with Dr. Leaf that a rate would be a very disagreeable thing; but to borrow the money from the bankers was only to put off the evil day. He asked what the law costs had already been.

The TOWN CLERK replied that they amounted to about £35,000.

Mr. WHITE pointed out that the ratepayers would not only have to pay the £40,000 already overdrawn, but possibly another £12,000; and this, with the £60,000 now required, would amount to considerably more than £100,000. He would like the ratepayers to have a taste of this splendid piece of municipal trading; but he was inclined to vote that the money should be borrowed from the bankers, though by doing so they would simply be putting off the evil day till March, when they would have to raise a much larger amount.

The recommendation was adopted by 37 votes to 3.

Mr. E. R. DEBENHAM, the Chairman of the Electric Supply Committee, said the Committee considered it highly desirable that the electors of Marylebone should be supplied with full and correct information as to the present position of matters, having regard to the recent judgment of Mr. Justice Buckley. On behalf of the Committee, he moved that the Council should have printed and circulated among the electors a transcript of the shorthand notes of the proceedings before his Lordship, and the judgment delivered by him.

Objection to the proposal was raised on the ground that very few people would read the papers; but eventually it was adopted.

Mr. WHITE next moved—"(1) That it be referred to the Legal and Parliamentary Committee to prepare and submit to the Council

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a Bill to be introduced in the next session of Parliament to relieve the borough of Marylebone from the obligation of purchasing the Marylebone portion of the Metropolitan Electric Supply Company's undertaking upon equitable terms. (2) That Mr. Boulnois, M.P., be respectfully asked to introduce the Bill; and that the President of the Local Government Board be requested to assist in passing the Bill into law."

After some remarks, the discussion was adjourned till the next meeting of the Council, early in February. In the meantime, the necessary steps will be taken for obtaining from the bankers the overdraft of £60,000 to satisfy the judgment of Mr. Justice Buckley.

GAS CHARGES AT NELSON.

At the request of the Gas Committee of the Nelson Corporation, the Engineer and Manager (Mr. Alfred J. Hope) has submitted a report containing the following comparison of charges for gas between ordinary and prepayment consumers both inside and outside the borough. He points out that each prepayment consumer used an average of 9965 cubic feet of gas last year, and that the net cost of a prepayment meter complete is 38s. 6d., against 23s. 6d. for an ordinary meter.

Comparison Inside the Borough.

	£	s.	d.
An ordinary consumer using 9966 cubic feet of gas at 2s. 9d. per 1000 feet equals		1	11
Meter rent, 5 per cent. on 38s. 6d.			10
Extra cost of collection per consumer per year			
An ordinary consumer using 9966 cubic feet per year would thus pay	1	10	2
A prepayment consumer using 9966 cubic feet per year at 27 feet per penny would pay	1	10	9
Difference			7d.

Each prepayment consumer inside the borough thus pays 7d. per year more than an ordinary consumer, after allowing for increased cost of both meter and collection.

Comparison Outside the Borough.

	£	s.	d.
An ordinary consumer using 9966 cubic feet of gas at 3s. per 1000 feet equals	1	9	11
Meter rent, 10 per cent. on 38s. 6d.		3	10
Extra cost of collection per consumer per year			10
An ordinary consumer using 9966 cubic feet per year would thus pay	1	14	7
A prepayment consumer using 9965 cubic feet per year at 24 feet per penny would pay	1	14	7

Each prepayment consumer outside the borough thus pays exactly the same per year as an ordinary consumer, after allowing for increased cost of both meter and collection.

THE ELECTRIC LIGHTING QUESTION AT DORCHESTER.

It appears, from what transpired at the last monthly meeting of the Dorchester Town Council, that some difficulty has been experienced in obtaining offers from Companies willing to take over the Electric Lighting Order of the Corporation, and supply the town with electric current. The Council have nevertheless applied to the Local Government Board for authority to borrow £16,000 for electric lighting purposes; and the Board have asked for a number of particulars in regard to the matter, as well as for plans and sections of any proposed buildings, and a general plan showing the positions of all the intended works, the course of the mains, and the limits of the district to be lighted. When applying for these details, Mr. Noel T. Kershaw, one of the Assistant-Secretaries of the Board, forwarded a copy of a letter they had received from Mr. C. H. Smith, the Honorary Secretary of the Ratepayers' Protection Society, calling their attention to the opposition entertained to the scheme in the town, and requesting them not to sanction the raising of money to carry it out until they had seen the result of an attempt which would be made in the Council to rescind the Standing Order in regard to the electric lighting project. When the letter was read by the Town Clerk, it was characterized as a piece of "phenomenal cheek" on the part of the writer; and it was unanimously resolved to take no notice of it. It has not, however, escaped the attention of people outside the Council; an "Overburdened Ratepayer" having written to the local paper eulogizing Mr. Smith's action, and expressing a wish that there were more like him to determinedly oppose the Council's extravagence. It seems that people get into the town, agitate until they succeed in having their expensive fads carried out, and then take their departure, leaving the deluded ratepayers the victims of thier misplaced confidence. If they continue apathetic, there is every possibility of this electric lighting scheme being a very heavy burden upon them.

BIRMINGHAM MUNICIPAL ENGINEERING SOCIETY.

This Society a few days since visited Smethwick, in order to inspect the labour-saving specialities in process of manufacture at the works of the New Conveyor Company; and it was a matter for congratulation among them to find the works contained at the time a number of automatic appliances in all stages of construction. Contracts were in progress for the works of the Auckland (N.Z.) Gas Company, for the Patent Bolt and Rivet Company, for the Gigion Chemical Works in Spain, for the Swansea Gas-Works, for the Barry Docks, and other important well-known firms. Two hours were spent in the inspection; and afterwards Mr. Gilbert Little, the Mayor of Smethwick (Alderman Bowden, J.P.), and Mr. Councillor Pinkney addressed the visitors—giving them a hearty welcome to Smethwick, which the

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SMETHWICK.

Mayor jocularly described as "the world's workshop." Referring to Mr. Councillor Pinkney, who is a strong advocate for technical education, his Worship mentioned that the name of "Pinkney" was well known to engineers, as it was cast on the Tangye gas-engine, which was now working all over the globe. In his remarks, Mr. Pinkney said it was a great pleasure to him to know that men like Mr. Little, who was a pioneer and a specialist, threw his works open, and the machinery he turned out, to the inspection of members of engineering societies. An hour or two spent in a works like those the members had been privileged to go over, was an advantage he hoped they fully realized. He urged them to go away determined that any works they might be called upon to manage should not have machinery in them less up to date than they had seen in the works of the New Conveyor Company. The thanks of the members to Mr. Little were tendered by the Hon. Secretary of the Society (Mr. Gamble). He mentioned that, though the members did not know that gentleman personally, they did so by reputation, from his published contributions to engineering subjects. The members were delighted to see that his son (Mr. Archibald Little) was following his father in this respect.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

A deputation from the Corporation of Glasgow, consisting of Lord Provost Sir John Ure Primrose and several other members of the Town Council, are at present touring in England, and perhaps farther afield, with a view to procuring information upon the matter of public lighting. It seems almost a work of supererogation for the Corporation who had such a magnificent display of artificial lighting in their midst in the Exhibition of 1901 to go from home in search of better methods of lighting; but, of course, it is a way which corporations have, and if the deputations succeed in picking up a few ideas from what they see in other towns, the community will benefit by their trip.

About three months ago, I ventured the opinion that more would be heard of dealings with the Town Council of Glasgow by Trades Unions. A fresh instance of this has arisen, the subject this time taking the form of a complaint that the Contractors for the supply of gas-meters are not paying the standard rate of wages. It will be remembered that the entire contract for the year which began on June 1 was given to Messrs. James Milne and Son, Limited, of Edinburgh. The complaining body is the Executive of the Scottish Brass Moulders' Union, the Secretary of which has sent a letter to Mr. J. G. Monro, the interim Town Clerk, asking that the attention of the Gas Committee be called to the matter. Last year the contracts for meters were held by four firms, and amounted to £12,000. Five weeks ago, it is stated, eleven brass moulders employed by the firm made an application for an advance of 2s. per week, to raise their wages to 34s. This was refused; and on Nov. 21 the men left in a body, and are still out of employment. An effort, it is stated, has been made, by interview with the firm, to ask that the request of the men be conceded; but this has been refused, and the representatives of the men informed that there is no dispute; that they have no need for the men; and that they are paying the same wages as other firms, which, the Executive say, is not correct. They quote several firms in Edinburgh and Leith who, they assert, pay the wages asked. It is hoped that the Gas Committee will see their way to request the Contractors to pay the standard rate of wages, or, failing this, that the Corporation will enforce the Standing Order which requires such wages to be paid. The interim Town Clerk has acknowledged receipt of the letter, and stated that it will be placed before the Gas Committee in due course.

A good deal of attention has been bestowed this week in Dundee upon the proposals of Mr. Alex. Yuill, the Gas Engineer and Manager, to bring the gas-works up to date, which at present they are not. Mr. Yuill's report upon the subject has been forecast by the local newspapers, and written about in nervous fashion. There is nothing extraordinary about the proposals; but, of course, when it is mentioned that some £40,000 may have to be expended in the increase of storage accommodation for gas, it is easy to understand how many in Dundee would ignorantly applaud anyone who would endeavour to prevent the outlay being made. The report will be considered by the Gas Committee, who, as business men, may be expected to give it reasonable consideration; but do not let anyone be surprised if the desire for economy does not run away with the necessity for efficiency. It may be taken for granted Mr. Yuill's cheaper alternative will be adopted.

At the meeting of the Gas-Works Committee of the Arbroath Town Council on Monday, the question of the supply of prepayment meters came up for discussion. A number of people, it was stated, were abstaining from using gas in consequence of their not being supplied with prepayment meters, and that most of them also wish to have cookers. In houses where ordinary meters are in use, to substitute prepayment meters for them would entail considerable expense. The Committee, taking into consideration the extra charge of 5d. per 1000 cubic feet which is made for gas consumed through these meters, were of opinion that the expense of substituting them for ordinary meters must be faced; and they instructed the Manager to supply, until further orders, prepayment meters to all who apply for them. Mr. Young also submitted a report on the alterations and extensions at the gas-works. His original estimate of the cost of the works amounted to £2000; and the actual outlay had been £113 less than the estimate.

In connection with the report before the Greenock Gas Committee, it is stated strong disapproval was expressed as to the quality of the gas, and the Manager was desired to do everything possible to increase the candle power. Mr. Ewing explained that the plant was imperfect; and it was remitted to the Works Committee to deal with the questions of purifiers and weighbridges, and to report. Mr. T. Mitchell said the quality of the gas was going from bad to worse. He had taken the trouble to go over the figures for the same five months of several years.

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BLACKBURN.	1,250,000	ST. CATHERINES (Remodelled) .	250,000	ACCRINGTON.	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT. . .	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA. . . .	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN. . . .	500,000	YORK (Second Contract) . .	750,000
WINDSOR ST., BIRMINGHAM (Second Contract) . . .	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract) .	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.).	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil) . . .	125,000
LINDSAY (Remodelled) . .	125,000	CRYSTAL PALACE DISTRICT .	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract). .	250,000	ENSCHEDE (HOLLAND) . .	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled) . .	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract) . .	750,000
		KINGSTON-ON-THAMES . .	1,750,000	TORONTO (Fourth Contract)	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

In 1899, the illuminating power was 25·41 candles; in 1900, it was 25·32 candles; in 1901, it was 22·73 candles; in 1902, it was 21·60 candles; and in 1903 it had fallen to 20·63 candles. What it would be next year he would not like to predict. Provost Anderson said that under their Provisional Order they had power to reduce the illuminating power; but it certainly was very low at present.

Mr. M'Lellan moved at the Lanark Town Council on Monday that a Committee be appointed to make inquiries with a view to the Corporation acquiring the undertaking of the Lanark Gas Company, Limited. He had long felt, he said, that the gas-works should be municipalized. One of his reasons for moving in the matter was the contemptuous manner in which the Gas Company had been treated by the Corporation whenever there was an opportunity. At the previous meeting, one gentleman, speaking to the minutes of the Electricity Committee, said that if they got first-class gas it would be a different matter. He also referred to a remark by Provost Brown a month or two ago regarding the quality of the gas. Statistics were submitted by Mr. M'Lellan to show that the average price of gas, as provided by private companies, is 4s. 8d. per 1000 cubic feet, and by corporations 3s. 9½d. Mr. Murphy thought it was unfortunate that Mr. M'Lellan had referred to the way in which the Gas Company were treated by the Council. His experience of the gas was that it had not strength enough to work a cooking-stove; and so, after he had put one up, he had to take it down again. Gas companies were now anxious to dispose of their works, in view of the many changes that are taking place in lighting; but he did not see any objection to inquiry as to the state of the gas-mains and the kind of coal which was being used by the Company. Mr. Graham said he did not recollect having made any slighting remarks at the last meeting. What he said was that at the present moment considerable alterations were going on at the gas-works, which no doubt would hinder them from supplying the best quality of gas. He moved the previous question. Mr. Mackay seconded. He had no doubt, as a shareholder in the Gas Company, that it would be to his interest, and to the interest of all the shareholders, if they could get the Town Council to take over the gas-works. The previous question was carried by eleven votes to four; so that there will be no transfer in Lanark—for some time at least.

At the Wishaw Town Council on Monday, Mr. Millar moved that plant for the recovery of sulphate of ammonia be erected at the Corporation gas-works. The subject was favourably entertained; and it was remitted to the Gas Committee and the Manager—Mr. P. B. Watson—to consider and report on it. The Law Committee recommended, in connection with the recent gas accusation, that, seeing Mr. J. M'Nair, the former Gas Manager, had resigned, the Council express their strong disapproval of Bailie John Gibson's conduct in connection with the purchases of coal, part of which found its way to the Wishaw Works at a very much higher sum than was paid by him for the coal. After discussion, this recommendation was, by six votes to three, disapproved; and a resolution was come to that a private detective be employed to make investigations with a view to proceedings being taken against the two persons chiefly concerned.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 19.

Sulphate of Ammonia.

There has again been good demand, resulting near the close in a further advance in values; the closing quotations being £12 7s. 6d. per ton f.o.b. Hull and Liverpool, and £12 8s. 9d. to £12 10s. per ton f.o.b. Leith. Inquiry for spring delivery is sustained, but the firmness of makers has precluded business on any large scale, £12 12s. 6d. to £12 15s. per ton being required. For delivery July-September, and for July-December, £12 10s. per ton has been paid f.o.b. Leith.

Nitrate of Soda.

This remains very firm at 9s. 7½d. and 9s. 9d. per cwt., according to quality, on spot.

LONDON, *Dec.* 18.

Tar Products.

Markets generally remain in about the same position; and there is very little business doing, doubtless owing to the approach of the holidays. The position of pitch is still very dull; and prices have a downward tendency, though it seems more than probable that foreign consumers are still holding off the market, believing in lower prices, so that in January we may see a revival of business. The demand for 90 per cent. benzol is still very strong, especially for gas enriching. Makers in London have no stocks. Prices remain very steady. There is not much doing in 50-90 per cent. just at present. From 7¾d. to 8d. is about market price; but consumers do not take much interest in the article. Further business is reported in toluol at 8d. for early delivery, but only to a limited extent, and for home consumption. The demand for creosote for export continues very strong; and it seems as if it was only the difficulty in obtaining barrels that prevents shipments being much larger. London makers have no stock; while the demand in the North for pickling purposes is fairly good. There is a decided improvement in solvent naphtha, especially for the heavier qualities. In anthracene, there is nothing of any importance to report. London makers still ask 2¼d. for "A" quality, 40 per cent.; but consumers at present will not pay this figure.

The average values during the week were: Tar, 23s. to 27s. 6d. Pitch, London, 40s. 6d. to 41s. 6d.; east coast, 38s. 6d. to 39s. 6d.; west coast, 37s. 6d. to 38s. 6d. Benzol, 90 per cent., 10¾d. to 11d.; 50-90 per cent., 7¾d. to 8d. Toluol, 7¾d. to 8d. Crude naphtha, 3½d.; solvent naphtha, 9½d. to 10d.; heavy naphtha, 11d. to 1s. Creosote, London, 1⅞d.; North, 1⅜d. to 1⅝d. Heavy oils, 2⅛d. to 2⅜d. Carbolic acid, 60 per cent., 1s. 6d. to 1s. 6¼d. Refined naphthalene, £5 to £8. Salts, 23s. 6d. to 28s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d. nominal.

[Owing to a clerical error, the price of London creosote was given in last week's "JOURNAL" as 1d. per gallon, whereas it should have been stated as 1⅞d.]

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FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

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MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

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THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

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Sulphate of Ammonia.

The market closes with a very firm tone. Beckton quote £12 15s. in any position, but really are not offering anything at present. The South Metropolitan Company appear to be fairly well sold. Their idea of value is about £12 10s. for December delivery. In Leith, business has been done at £12 7s. 6d. for prompt. Makers as a rule ask £12 8s. 9d.; while for forward an offer of £12 10s. is reported to have been declined for delivery all over next year. In Hull, the general tone of the market is good. Business is reported at £12 5s. for prompt. Makers decline to quote for forward delivery. In Liverpool, business was done at £12 5s. for early shipment. There are no forward transactions to advise.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The chief event of the past week has been the award of Lord James for a reduction of 5 per cent. in wages, which, following immediately upon the rejection by the miners of the terms for a renewal of the Coal Trade Conciliation Board (mainly because they included this reduction), renders the situation perhaps somewhat precarious as to what the action of the miners may be when the Board expires at the end of March. In some quarters, there are undoubtedly apprehensions of possible trouble with the men, who seem thoroughly determined to resist any reduction whatever in wages; and there has been a good deal of talk among the younger colliers for some time past of having another strike rather than give way. For the present, of course, the miners are bound under the Conciliation Board to accept the award of Lord James; and, in the meantime, no doubt further efforts will be made to bring about some satisfactory understanding for a renewal of the Board. Unless this can be done, it is questionable whether the miners will, after then, submit to a continuation of the reduced rate of wages. As to trade, a fairly active business is still passing through in house-fire qualities, which is keeping pits on full time and taking away their present output. Prices are steady at the list basis rates of 13s. 6d. to 14s. 6d. per ton for best sorts, 11s. and 11s. 6d. to 12s. 6d. for seconds, and 9s. 6d. to 10s. 6d. for common; but any advance upon these is not obtainable, nor would there seem to be any possibility of prices at all hardening during the remainder of the winter. Steam and forge coals still move away just moderately, and are about steady at late rates, ranging from 7s. 9d. to 8s. 6d. per ton for steam coals at the pit. Good qualities of slack continue in fairly brisk demand. Most of the Lancashire collieries are disposing of all they are at present producing, with stocks being filled up here and there, and prices firm at about 6s. 3d. up to 6s. 9d. at the pit for the best qualities. Medium and common sorts are still fairly plentiful, and not more than maintaining late rates —averaging 4s. to 4s. 6d. per ton for common, and 5s. to 5s. 6d. for medium sorts. For shipment, there has been rather more inquiry and slighly better prices obtainable, ranging from 9s. 3d. up to 9s. 9d. for good steam coal at the ports.

Northern Coal Trade.

Trade is now very active, and there is a full demand for coal for delivery to the end of the year; while there will be two weeks of short working. In the steam coal trade, the demand is brisk, and the shipments are full for this period of the year. The price of best Northumbrian steams is firmer at 9s. 6d. per ton f.o.b., second-class steams vary a little from 8s. 3d. to 8s. 6d., and steam smalls are from 4s. to 4s. 3d. In the gas coal trade, the demand is now at its fullest, and the contract quantities are very large; so that the best kinds of Durham gas coals are very firm in price. The quotations are from about 8s. 3d. to 9s. per ton f.o.b.; while the new contracts—few at present in number—are based on nearer the lower price, but determined by the time of the delivery. The production of gas coke is now at its fullest, the stocks in some cases are increasing, and the price is a little weaker. Where supplies can be shipped, good gas coke is quoted about 14s. per ton f.o.b.

Scotch Coal Trade.

There has been greater briskness in trade, due to the advent of the holidays; but there has been no variation in prices, which remain as follows: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 6d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amount to 230,688 tons—an increase of 30,073 tons upon the previous week, and of 18,141 tons upon the corresponding week of last year. For the year to date, the total shipments have been 10,727,552 tons —an increase of 106,048 tons upon the same period of last year.

Use of Water-Meters in the United States.—At Cleveland (Ohio), water-meters are being introduced more rapidly than in any other city of the United States; their use being now compulsory, and the work being done by the city at its own cost. From 1891 to 1901 the consumption and pumping of water went up 150 per cent., though the population had only increased 46 per cent.; and it was estimated that 55 per cent. of the water pumped was wasted. In 1901, the meter system was adopted; and in 1901 and 1902 the city purchased 26,000 small meters. At the present time 21,000 out of 53,000 water services are provided with meters, and the work is steadily progressing. The amount of pumping for the first nine months of 1903 was 7 per cent. less than for 1900, while that of 1900 was 39 per cent. greater than in 1897; so that the three years show practically a reduction of 46 per cent. The pumping of 1902 was very little greater than in 1901; while that of 1903 was 12 per cent. less—up to October—than for the same period in 1902. The receipts from water-rates in 1903, on the other hand, are 32 per cent. higher than those for 1900. The meters were paid for out of the net earnings of the Water Department, and distributed generally throughout the city. The rates are such as to encourage legitimate use of water; and the objections made by some doctors that any restriction in supply would result in deterioration of health and decency have, it is reported, proved to be unfounded.

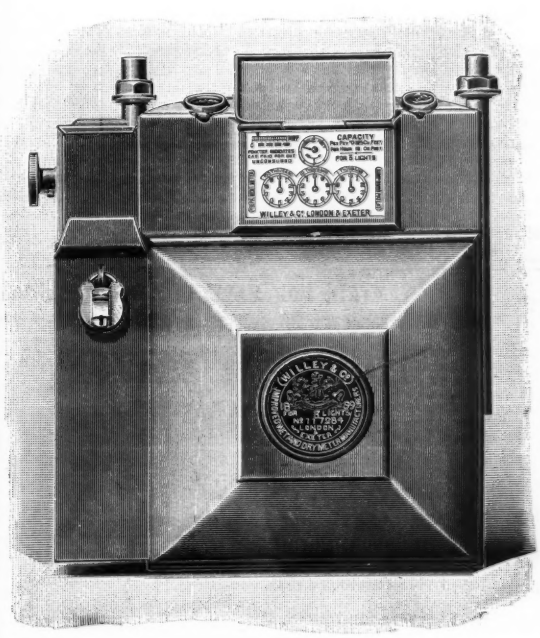
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LONDON AND EXETER.

Sale of Gas Stock.—Last Thursday, Mr. J. T. Reed, offered for sale by auction, at the offices of the South Shields Gas Company, £10,000 worth of new stock under the Act of 1886. The stock was put up in lots of £100; the highest price realized being £145 10s., and the lowest £143. The average price obtained was £143 18s. 3d.

Sunday Gas-Testing in the South Metropolitan Company's District.—The Public Control Committee of the London County Council report the result of their legal proceedings in which they have recently involved the South Metropolitan Gas Company, and announce that they had given instructions for the testings to be recommenced in the Company's district as from last Sunday.

A Dellwik-Peebles Water and Oil Gas Plant at Barking.—The Barking Gas Company recently invited tenders for a carburetted water-gas plant; and at their meeting last week it was decided to put down a combined Dellwik blue water-gas and a Peebles oil-gas plant, on the lines adopted at the Cleethorpes Gas-Works. The order has accordingly been placed with Messrs. R. and J. Dempster, Limited, of Manchester, for the complete installation.

Proposed Extension at the Wallingford Gas-Works.—At a special meeting of the Wallingford Town Council on Wednesday, it was decided to apply to the Local Government Board for authority to raise a further loan of £3000 (half of which amount has already been spent), to provide additional retorts, &c., for the gas-works. It was stated that the consumption of gas has increased by 33 per cent. since the undertaking has been in the hands of the Council.

Growth of Gas Consumption at Southport.—According to a compilation which has been prepared for the Gas Committee of the Southport Corporation by the Engineer (Mr. John Booth), the annual make of gas has increased about 100 million cubic feet in the past ten years. In the year ending March 31, 1893, it was 323,481,000 cubic feet; while in the past financial year it was 428,280,000 cubic feet. The maximum day's make is now 2,264,000 cubic feet; but the works at Crowlands are equal to the production of 3,270,000 cubic feet.

City Incandescent Gas-Lamp Contracts.—Messrs. H. Greene and Sons, Limited, of the Surrey Engineering Works, Blackfriars Road, have received a contract from the Corporation of the City of London, for the provision and erection of lanterns and parts for incandescent lighting round the City, comprising seventy streets, and extending from Ludgate Hill to Trinity Square as the one boundary, and from Cannon Street to Broad Street, and Smithfield as the other boundary. There will be approximately 1000 lanterns and brackets to be supplied.

Interruption of the Gas Supply at Norwich.—In connection with the extensions now proceeding at the Norwich Gas-Works, a girder was being hoisted into position last Saturday week by one of the contracting firms employed. The rope used for lifting the girder broke, and let it fall on to the large main through which the whole of the gas to the city was at the time passing. The main was smashed, with the result that the supply was temporarily stopped. Fortunately, however, the Engineer (Mr. T. Glover) and his staff were quickly on the spot, and were able to arrange for the restoration of the supply. The inconvenience caused by the interruption was soon made evident by the demand upon the Company's telephonic system; for, though the accident happened in the daytime, a large amount of gas was being used for fuel and power purposes.

Bilston Gas Company.—At the annual general meeting of this Company on the 4th prox., the Directors will report a balance of £4097 after paying the usual interim dividend. Out of this, it is proposed to pay dividends of 5s. 6d. and 4s. per share on the "A" and "B" shares respectively; making 11s. and 8s. for the year, and leaving a balance of £1412 to be carried forward. The income of the Company for the year ending the 30th of September was £29,354, and the expenditure £23,581—leaving a balance of £5773.

West Greenwich Gas-Works Institute.—The annual dinner of the Institute, of which Mr. Alfred Showell is the Hon. Secretary, took place on Saturday—Mr. J. F. Braidwood (the President) in the chair. About 170 sat down; among the guests being Mr. H. Austin and Mr. C. T. Drumgold, two of the Directors of the South Metropolitan Gas Company. Mr. J. A. Butcher (who, with Mr. Austin, represents the workmen shareholders upon the Board) was unavoidably absent through indisposition. The toast of "The South Metropolitan Gas Company" was proposed by the Chairman, and responded to by Mr. Austin. During the evening prizes won by members in various games were presented by the President. All the arrangements were carried out by the men themselves. The Holy Trinity Orchestral Society, under the direction of Mr. Frank Powell, performed a selection of music during dinner; and the toasts were interspersed with some well-executed vocal and instrumental music.

A popular lecture upon "Coal and its Product Gas" was recently delivered to the Augustine Literary Society, Edinburgh, by Mr. Henry O'Connor, of Messrs. James Milne and Son, Limited. The manufacture of gas was illustrated by a complete model gas-works.

The Stony Stratford Gas and Coke Company, Limited, has been registered with a capital of £3000 in £10 shares; being a reincorporation, under the Companies Acts, 1862 to 1900, of the Stony Stratford Gas and Coke Company, originally constituted by Deed of Settlement dated Sept. 16, 1837. At the date of conversion into a limited Company, all the shares had been taken up and paid for in full.

The First Garden City is commencing operations by boring an artesian well in search of an ample supply of pure water, which is of primary importance for such an undertaking. The founders have placed this work with Messrs. Le Grand and Sutcliff, of Bunhill Row, E.C., who started boring last week—commencing with 16-inch tubes at a high elevation on the estate on the road between Baldock and Hitchin. A depth of over 100 feet has already been penetrated into the lower chalk formation, from which an ample supply is expected to be derived.

The Hampton Court Gas Company have adopted the system of maintaining incandescent gas-burners. In an attractively printed circular which their Engineer and Manager (Mr. W. E. Price) is now sending out, they inform consumers that they are prepared to send competent men periodically to clean incandescent burners free of charge, and to replace mantles, chimneys, rods, &c., at the lowest possible prices. It is pointed out that it is by keeping the burners clean, and the mantles and chimneys in good condition, that the incandescent gas system, which in the Company's district is ten times cheaper than the electric light, gives the best results.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

SECRETARY AND ASSISTANT-MANAGER. Bridlington Gas Company. Jan. 9.
DRAUGHTSMAN. No. 4142.
WORKING MANAGER. Mickleover and Etwall Gas Company.
INSPECTOR. No 4140.
ASSISTANT INSPECTOR (London). No. 4141.
FITTER. Northfleet Gas-Works.
GAS-FITTER AND SERVICE LAYER, &c. Cudworth Gas Department. Jan. 4.

Patent for Gas-Washer for Sale.

BURGEMEISTER. Celle, Germany.

Plant for Sale.

STATION METER. Shepshed Gas-Works.
RETORT-BENCH FITTINGS, &c., BOILERS, EXHAUSTER, CONDENSERS, SCRUBBER, PURIFIERS, STATION METER, GASHOLDER, VALVES, &c. Ardrossan Gas Department. Offers by Jan. 15.

Sales of Stocks and Shares.

BARKING GAS COMPANY. Dec 31.
NORTH MIDDLESEX GAS COMPANY. Dec. 29.
SOUTH METROPOLITAN GAS COMPANY. (Consumers and Employees only).

TENDERS FOR

Coal.

RAWMARSH GAS DEPARTMENT. Tenders by Jan. 5.

Fire-Clay Goods.

PADIHAM GAS DEPARTMENT. Tenders by Jan. 12.
ROCHDALE GAS DEPARTMENT. Tenders by Jan. 1.

Gasholder.

AMSTERDAM CORPORATION. Tenders by Feb. 15.

Meters.

CLACTON GAS DEPARTMENT. Tenders by Jan. 11.

Mouthpieces, &c.

PADIHAM GAS DEPARTMENT. Tenders by Jan. 12.

Retorts.

PADIHAM GAS DEPARTMENT. Tenders by Jan. 12.

Tar.

CLACTON GAS DEPARTMENT. Tenders by Jan. 11.

Tar and Liquor.

GAINSBOROUGH GAS DEPARTMENT. Tenders by Dec. 29.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL,
5, CROOKED LANE, LONDON, E.C.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
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Payable in Advance. If credit is taken, the charge is 25s. a year.
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All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of Gas Apparatus, ROSE MOUNT IRON-WORKS, ELLAND.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

"NUGEPE" CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

SECRETARY and Assistant Manager wanted by the Bridlington Gas Company. Salary £250. Must be over Thirty Years of Age, and thoroughly experienced and competent in all the various duties involved in this appointment to a small up-to-date Gas Company.
Our make is about 100 Millions.
This is an absolutely open Competition, as we have no local or other Candidate in reserve.
The names of the candidates will not be made public.
Write only, in the first instance, not later than Jan. 9, to GEORGE BRAMBLES, Esq., Chairman and Managing-Director, Gas Company, BRIDLINGTON.

WANTED, a good Fitter, used to Slot Installations and Meter and Stove Fitting.
State Age and Wages required, with References, to C. FOSTER VEEVERS, Secretary and Manager, Gas-Works, NORTHFLEET.

DRAUGHTSMAN WANTED.
WANTED, immediately, a thoroughly practical DRAUGHTSMAN, well up in Steel Tanks, Gasholders, and Inclined Retorts.
Apply, by letter, with *copies* of References, to No. 4142, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

INSPECTOR required by a Gas Company near London. Must be thoroughly competent to superintend Service Laying and Fitting work.
Apply, by letter, stating Experience and Wages required, enclosing *copies* of not more than two Testimonials, to No. 4140, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MICKLEOVER AND ETWALL GAS COMPANY, LIMITED.
WANTED, a Working Manager. Make about 10 Millions. Regenerator Furnaces, Exhauster, &c. Able to lay Services, &c. House and Garden with Coal and Gas provided.
Apply, by letter, stating Age, Experience, and Wages required, not later than Jan. 4, 1904, to the SECRETARY, Gas Company, Etwall, DERBY.

ASSISTANT-INSPECTOR.
WANTED by a London Gas Company, an ASSISTANT-INSPECTOR. Must have thorough knowledge of all branches of Gas Fitting, and be a good Canvasser, capable of preparing schemes and estimates for installing Incandescent Gas Lighting in any class of premises.
Apply by letter, stating Age, Experience, and Salary required, to No. 4141, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CUDWORTH GAS SUPPLY.
WANTED, by the Cudworth Urban District Council, a steady and competent Man as SERVICE LAYER, METER and LAMP INSPECTOR and GAS-FITTER. One used to Slot Installations and Collection preferred. Wages 35s. per week.
Particulars of duties, &c., may be obtained from the undersigned.
Applications, in own Handwriting, stating Age, Experience, and present Employment, when at liberty, and *copies* of Testimonials, to be sent to the undersigned not later than the 4th of January, 1904.
W. E. RALEY,
Clerk to the Council.
Barnsley, Dec. 17, 1903.

GAS PLANT for sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD — Twin-Cylinder Gas-ENGINE, 6 n.h.p., by Crossley; Cylinders 8 in. diameter by 18 in. stroke, and Gas-Bag.
NEW GASHOLDER SHELLS, 40 feet diameter by 12 feet deep, and 50 feet diameter by 15 feet deep, with or without New Steel Tanks and Standard Guides.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

GAS-WASHER PATENT FOR SALE.
THE English Patent for the "Burge-meister Gas-Washer," described in the "JOURNAL" for Oct. 13 last, p. 102, is for SALE.
For Particulars, apply to F. BURGEMEISTER, Ingénieur, Director der Gasanstalt, Celle, Hanover, GERMANY.

GAS PLANT FOR SALE.
THE Ardrossan Town Council have for SALE at their old Gas-Works, Glasgow Street, Ardrossan, the following Plant—viz., Retort-Bench Fittings, Wrought-Iron Hydraulic Main, Vertical Steam-Boiler, Small Exhauster, Two Condensers (8-inch and 4-inch), Vertical Scrubber, Four Purifiers (12 feet square with or without overhead Lime Floor and Shed), Two Station Meters, Gasholder (40 feet diameter and 14 feet deep), Three Egg-end Boiler-Tanks, Small Tangye Pump, Piping Valves, Cocks, and other Castings.
Mr. A. Gillespie, Consulting Engineer, 65, Bath Street, Glasgow, will supply Particulars; and Offers are to be lodged with the Subscriber not later than the 15th of January, 1904.
JAMES COOK,
Town Clerk.
Ardrossan, December, 1903.

1500 Feet Cowan Station Meter, with 4-inch Connections and Bye-Pass Valves, in Good Working Order, FOR SALE.
SHEPSHED GAS-WORKS, LEICESTERSHIRE.

URBAN DISTRICT COUNCIL OF PADIHAM.
(GAS DEPARTMENT.)
IRONWORK.
TENDERS are invited for the supply and delivery of Self-Sealing MOUTHPIECES, &c., all to be delivered at the Gas-Works, Padiham.
Forms of Tender and full Particulars may be obtained from Mr. A. J. Jackson, Gas Engineer and Manager.
Sealed Tenders, endorsed "Ironwork," to be sent to the Chairman of the Gas Committee, Council Offices, Mill Street, Padiham, not later than the 12th day of January, 1904.
The Council do not bind themselves to accept the lowest or any Tender.
J. C. WADDINGTON,
Clerk to the Council.
Council Offices, Padiham,
Dec. 17, 1903.

URBAN DISTRICT COUNCIL OF PADIHAM.
(GAS DEPARTMENT.)
FIRE-CLAY MATERIALS.
TENDERS are invited for the supply and delivery of Machine-Made RETORTS, FIRE-BRICKS, TILES, &c., all to be delivered at the Gas-Works, Padiham.
Form of Tender and full Particulars may be obtained from Mr. A. J. Jackson, Gas Engineer and Manager.
Sealed Tenders, endorsed "Fire-Clay Materials," to be sent to the Chairman of the Gas Committee, Council Offices, Mill Street, Padiham, not later than the 12th day of January, 1904.
The Council do not bind themselves to accept the lowest or any Tender.
J. C. WADDINGTON,
Clerk to the Council.
Council Offices, Padiham,
Dec. 17, 1903.

CLACTON URBAN DISTRICT COUNCIL.
GAS-METERS.
THE above Council are prepared to receive TENDERS for the supply of PREPAYMENT and ORDINARY DRY GAS-METERS.
Full Particulars may be obtained upon application to Mr. Sydney Francis, Assoc.M.Inst.M.E., the Council's Engineer, Town Hall, Clacton-on-Sea.
Tenders, sealed and endorsed "Tenders for Meters," to be delivered to the undersigned not later than Four o'clock on Monday, the 11th of January, 1904.
The Council do not bind themselves to accept the lowest or any Tender.
GEO. T. LEWIS,
Clerk to the Council.
Town Hall Buildings,
Clacton-on-Sea, Dec. 18, 1903.

CLACTON URBAN DISTRICT COUNCIL.
TAR.
THE above Council are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works for the ensuing Twelve Months.
Particulars may be obtained from Mr. Sydney Francis, Assoc.M.Inst.M.E., the Council's Engineer, Town Hall, Clacton-on-Sea.
Sealed Tenders, endorsed "Tender for Tar," to be delivered to the undersigned not later than Four o'clock on Monday, the 11th of January next.
The Council do not bind themselves to accept the highest or any Tender.
GEO. T. LEWIS,
Clerk to the Council.
Town Hall Buildings,
Clacton-on-Sea, Dec. 18, 1903.

RAWMARSH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
THE Council are prepared to receive TENDERS for the supply of 2000 Tons of GAS COAL for Six Months (January to July), or 4000 Tons for Twelve Months (January to December), to be delivered either at the Gas-Works, Parkgate, or Midlands Railway Sidings, Parkgate.
Specifications or other Information may be obtained from the Gas Manager or from the undersigned.
Separate Tenders for Six or Twelve Months to be sent in to me not later than Tuesday morning, the 5th of January, 1904, endorsed "Coal Tender."
The Council do not bind themselves to accept the lowest or any Tender.
By order,
J. W. BELLAMY,
Clerk to the Council.
Council Offices, Rawmarsh,
Dec. 18, 1903.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.
Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

GASHOUDER ± 60.000 M³.

DE Directeur der Gemeente-Gasfabrieken te Amsterdam vraagt inzending van VOLLEDIGE projecten met verbindende opgaven der pryzen waarvoor en tydruimte waarbinnenge gadigden aannemen te bouwen op het terrein der Oostelyke Gasfabriek aldaar:

Een DRIE LIFTS TELESCOOP-GASHOUDER (inclusief fundeering) van ± 50 Meter diam., nuttig inhoudend ± 60.000 M³. Als kuiptype wordt een ringbassin van geslagen yzer of staal verlangd, gebouwd hoogstens 2,50 M. boven den beganen grond. Inlichtingen in loco worden verstrekt door den Ingenieur Onderdirecteur der Gem. Gasf. (Directeur der Oostelyke Gasfabriek). Schriftelyke aanbiedingen franco te adresseeren aan "den Wethouder voor de Gemeente Bedryven, Raadhuis, Amsterdam," voor of op 15, Februari, 1904, des v.m. 12 uur.

BOROUGH OF ROCHDALE.

TO FIRE-BRICK MAKERS AND OTHERS.

THE Gas Committee of the above Corporation invite TENDERS for the supply of such quantities of FIRE-BRICKS, BLOCKS, TILES, &c., as they may require during a period of Twelve Months from Jan. 1, 1904.

Forms of Tender may be obtained on application to Mr. T. Banbury Ball, the Manager at the Gas-Works.

Tenders, endorsed "Fire-Clay Goods," must be sent in to me not later than noon on Wednesday, Dec. 30, 1903.

By order,
JAMES LEACH,
Town Clerk.

Town Hall, Rochdale,
Dec. 17, 1903.

GAINSBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR AMMONIACAL LIQUOR.

THE Gas Committee of the above Council are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Gas-Works for a period of Twelve Months from the 1st of January, 1904.

Further Particulars may be obtained on application to the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works, Gainsborough, not later than Tuesday, Dec. 29, 1903.

The Committee do not bind themselves to accept the highest or any Tender.

JOHN BALDWIN,
Manager.

Gas-Works, Gainsborough.
Dec. 10, 1903.

BARKING GAS COMPANY.
THE BARKING GAS ACTS 1867 AND 1902.

ISSUE by Tender of £11,666 Redeemable DEBENTURE STOCK, bearing Interest at the rate of £4 per cent. per annum.

Particulars and Conditions of Tender may be obtained on Application at this Office.

Tenders must be sent in not later than Five p.m. on the 31st of December, 1903.

The Directors do not bind themselves to accept the highest or any Tender.

By order of the Directors,
STUART MORRIS,
Secretary.

Offices of the Company:
Gas-Works, Barking, Essex.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the Directors of this Company will OFFER the sum of £100,000 ORDINARY STOCK "to all the Gas Consumers and Persons in the employ of the Company," pursuant to the provisions of the South Metropolitan Gas Act, 1901.

Full Particulars thereof, together with the Price of such Stock, will be sent to the Consumers with the gas accounts for the Christmas quarter.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road, S.E.,
Dec. 16, 1903.

NORTH MIDDLESEX GAS COMPANY.

SALE BY TENDER OF
£3000 FIVE PER CENT. PREFERENCE STOCK
AND 300 SEVEN PER CENT. ADDITIONAL
ORDINARY SHARES OF £10 EACH.

NOTICE is Hereby Given, that the Directors of the North Middlesex Gas Company will offer the above Stock and Shares for SALE BY TENDER during the ensuing period ending the 29th of December, 1903, the last day for the reception of Tenders being Tuesday, the 29th of December, 1903.

Particulars of the Sale and Forms of Tender may be had on Application to the undersigned, or at the District Office of the Company, No. 11, The Broadway, Church End, Finchley.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Office:
5 & 6, Great Winchester Street,
Old Broad Street, London, E.C.
Nov. 27, 1903.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

NOTICE is Hereby Given, that the ACME SUNLIGHT GAS SYNDICATE, LIMITED, of Palace Chambers, 9, Bridge Street, in the City of Westminster, seeks LEAVE TO AMEND THE SPECIFICATION OF LETTERS PATENT No. 15,396 of 1898, granted to David Louis Baumgarten for "Acetylene Gas-Generators."

Particulars of the proposed Amendment were set forth in the "Illustrated Official Journal (Patents)" issued on the 16th of December, 1903.

Any person or persons may give NOTICE OF OPPOSITION to the Amendment (on Form "G") at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."

C. N. DALTON,
Comptroller-General.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

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LIMITED,
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PETROLEUM GAS SYNDICATE

Supply and erect Complete Installations of their

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On SALE, HIRE, or ROYALTY.

PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.

The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.

Offices: **28, Victoria St., Westminster.**
Works: **10, Rochester Row, S.W.**

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—**Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.**

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And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

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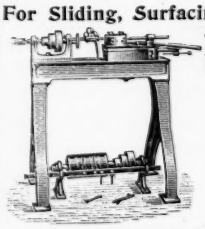
For Sliding, Surfacing, Screw-cutting, and Plain Turning. Milling Machines, Planing Machines, Slide Rests, Chucks, &c.



Lathes and Tools of my make may be inspected by any intending purchaser at addresses given below.

Agent for Scotland:
THOS. HILL & Co., 66, Robertson Street, Glasgow.
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PATENT LAMPS for INTERIOR LIGHTING.

Suitable for
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Can also be made as Ventilating Lights for Public Halls and Private Rooms.

6A. LAMP.

Can be adjusted to suit any Quality of Gas.

The highest efficiency yet obtained from Low-Pressure Incandescent Gas Lighting without mechanical aid.

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Prices and Analysis on application.
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Operated Entirely by One Handle
Class A lifts 24 ft.
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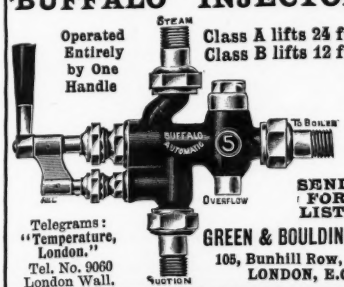

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Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
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Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
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We don't know whether you use
ENGINE AND CUP GREASE,
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None like them have ever been known. Ask for No. 6 Catalogue.
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FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.
Full Particulars on application to the Patentees:
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THE PERFECT MANTLE COY.
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MANUFACTURERS OF THE WELL-KNOWN
SUPERIOR "PERMCO"
MANTLE, IN COTTON AND RAMIE.

Under Welsbach Licence. Can be used legally with any Burner.
Trade Price 26s. 6d. per Gross.
Reduction for Quantities.

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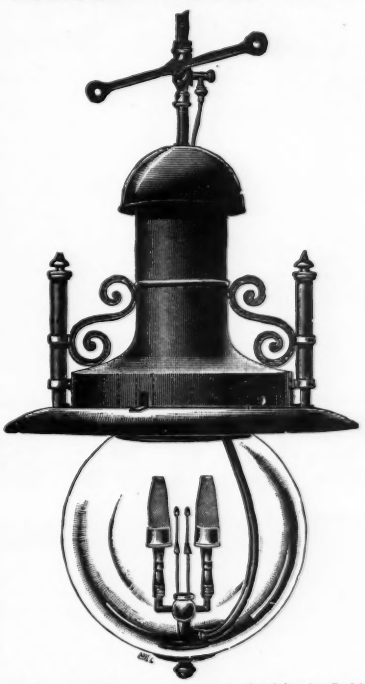
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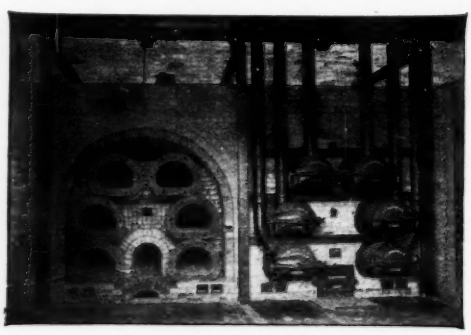
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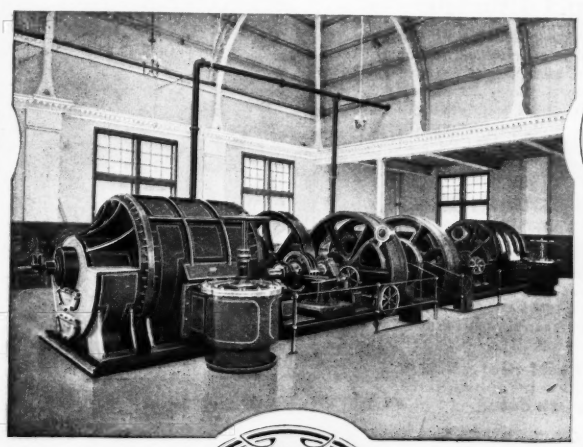

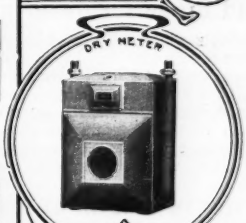

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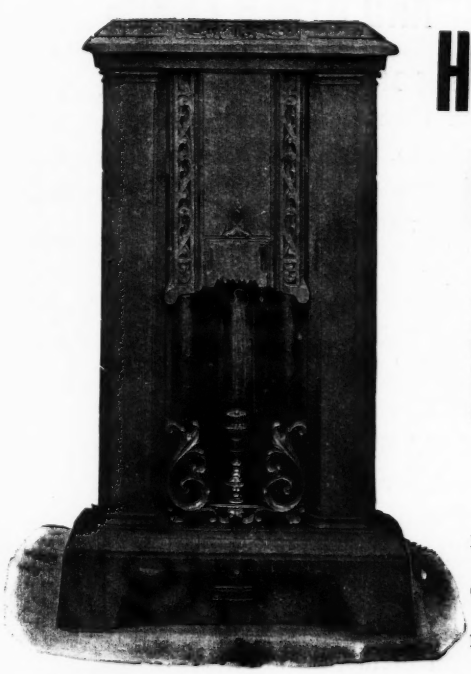

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The "LANCET" of the 24th of January, 1903, published the Report on this new system of producing radiant heat from Gas, by the introduction of vapour into hot Gases, for the purpose of increasing expansion, by which the same kind of Heat is produced as by the Electric current, at one-tenth of the cost. These Stoves are constructed of Cast Iron without any Sheet Metal Tubes, and supplied black or enamelled in colours.

Larger sizes are made with Two Burners or Asbestos Gas Fires.

SIZE—1 ft. 9 in. wide, 3 ft. high, 7 in. deep.

PRICE.

Fine Cast and Blacked.	£3 3 0
Do. with Polished Brass Ornament and Electro-Bronzed Panel	4 0 0
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Do. with Polished Brass Ornament and Electro-Bronzed Panel.	5 2 6
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Forty-Division Cabinet, with Base and Cornice on the Unit Principle.

WARNING

TO PURCHASERS OF "SICLOPS" AND OTHER LAMPS

WHEREAS it has come to the knowledge of Moffat's Limited, of 155, Farringdon Road, London, who are the Owners of the British Letters Patents of No. 14,553 A.D. 1900 and No. 23,222 A.D. 1900, under which their **LUCAS** Incandescent Intensive Gas-Lamps are manufactured and sold, that Lamps under various names including the **"Siclops"** have been, and are being imported into, or manufactured and sold in, the **United Kingdom** in infringement of the same,

NOTICE IS HEREBY GIVEN to the Trade and Public generally, that the said Moffat's Limited, intend to institute, and rigorously prosecute, proceedings against all Persons, Firms, or Companies Importing, Manufacturing, Purchasing, Selling, or Using any such Lamps.

Proceedings have already been commenced for an Injunction to restrain the Infringement of the said Letters Patents and for Damages against **Messrs. J. & W. B. SMITH, of 19-23, FARRINGDON ROAD, LONDON, E.C.,** in respect of the **"SICLOPS" Lamp.**

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CONDENSERS,
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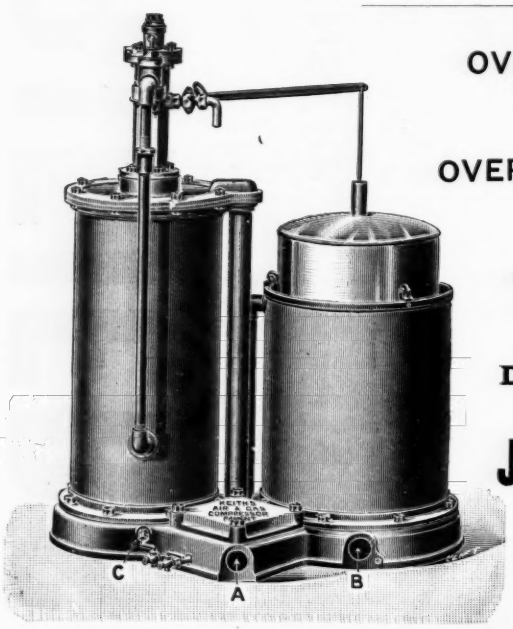

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already in use, with lighting capacity of

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COAL TAR PRODUCTS.

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METHANE-HYDROGEN WATER-GAS PLANT.

3 gallons Tar and 20 lbs. Coke produce 1000 cubic feet 10 to 12 Candle Power Gas of the following composition—

Hydrogen	**64·4 per cent.**
Methane	**12·0 „ „**
Unsaturated Hydrocarbons	**3·0 „ „**
Carbon Monoxide	**15·0 „ „**
Nitrogen and Carbon Dioxide	**5·6 „ „**
	100·0
Calorific Value	**400 B.T.U.**

See **Prof. VIVIAN B. LEWES'S** Lecture before Society of Arts, reported in the "JOURNAL OF GAS LIGHTING," Dec. 9, 1902.

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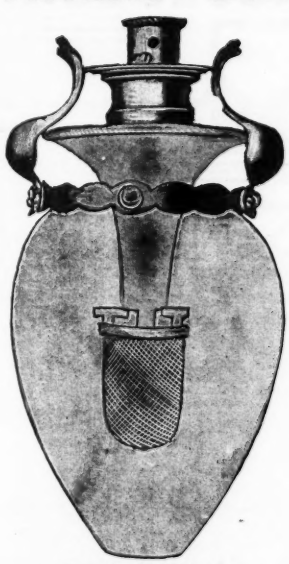

One-third full size.
Price: Burner with Mantle, **6/6.**
Globes from **8d.** each.

No. 1 BURNER.

The most up-to-date and economical system of gas lighting, artistic in appearance and absolutely shadowless, and readily attached to existing fittings.

A BRILLIANT WHITE LIGHT OF 65 STANDARD CANDLE POWER.

Gas Consumption only 3 cubic feet per hour.

The decorative appearance of Electric Light at one-tenth the cost.

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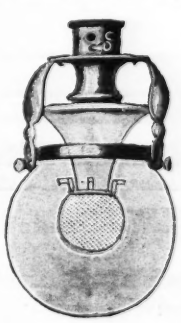
Is the nearest approach to Electric Light, and lends itself more than any other gas-burner to private house lighting, having an exceedingly pretty effect when fixed in clusters of 2, 3, or 5 lights.

20 standard candle power.



Consumption of Gas, 1 foot per hour.

One-third full size.
Price: Burner with Mantle, **4/6.** Globes from **4d.** each.

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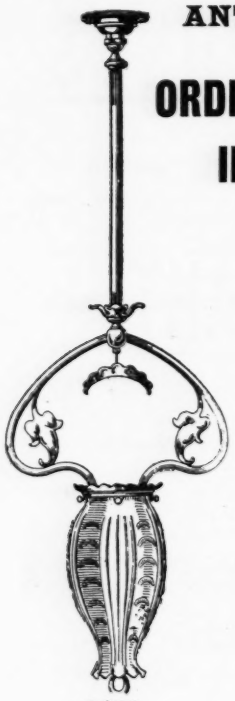
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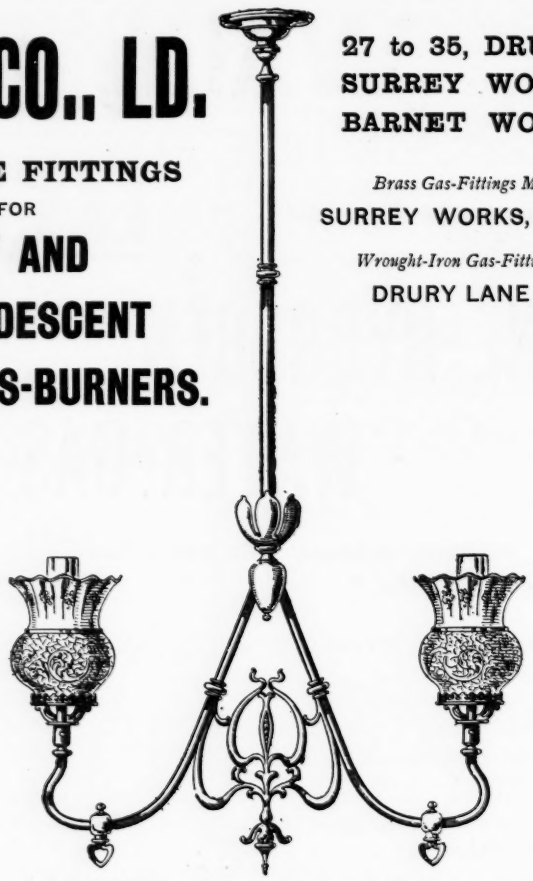

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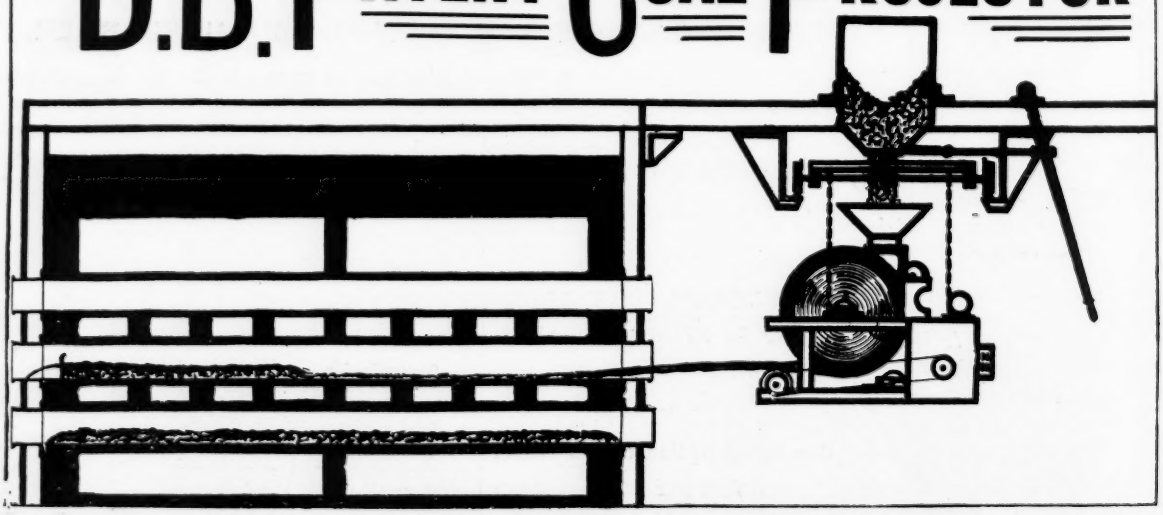
THE D.B. PATENT COAL PROJECTOR



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IT is the Simplest, the Cheapest, and the most perfect Retort Charging Machine ever invented. **IT** is a power Driven Machine. **IT** is suitable for the smallest as well as the largest Gas-Works. **IT** will charge Retorts 20 feet long as well as shorter ones from one end. **NO** part of the Machine enters the Retort nor comes within 4 feet of it. **ENORMOUS** savings in labour, in wear and tear, and in first cost. **IT** will charge upwards of 240 Retorts per hour.

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ESTABLISHED 1860.

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including base, ring, and ladder rest.
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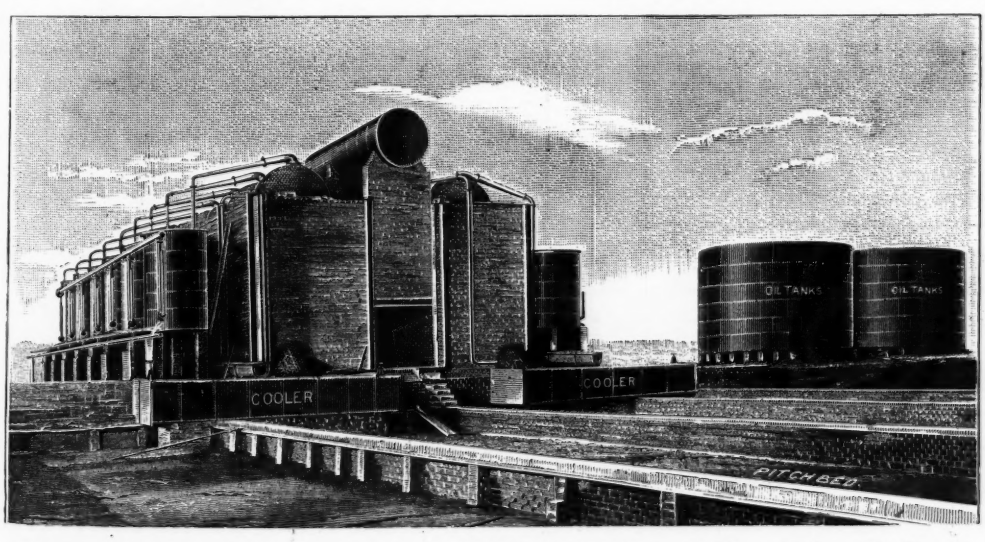

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Grand Prix - - Paris Exhibition, 1900.

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Erected since 1891, and being worked at, or orders have been received and in hand from, the following Gas-Works:—

Name of Gas-Works.	Number of Benches.	Number of Retorts.	Name of Gas-Works.	Number of Benches.	Number of Retorts.
Altona	22	198	Kiel	16	144
Aalborg	6	54	Ludwigshafen	16	144
Barcelona	14	126	Lübeck	4	36
Basel	11	99	Lynn (U.S.A.)	5	45
Berlin II.	14	126	Malaga	6	54
Berlin III.	15	135	Malmoe	12	108
Berlin IV.	24	216	Mariendorf, Berlin, I. C. G. A.	32	288
Berlin V. (Schmargendorf)	20	180	Mannheim	6	54
Berlin, I. C. G. A.	46	414	Mainz (Maintz)	7	63
Bielefeld	8	72	Muelhausen i. Els.	10	90
Bockenheim, near Frankfort	29	261	Muehlhausen i. Th.	4	36
Bremen	30	270	Mailand (Milan)	24	216
Brooklyn (U.S.A.)	5	45	München-Gladbach (Munich)	8	72
Brüssel (Brussels)	8	72	Pest (Pesth)	15	135
Cassel	17	153	Pest Mineralölfabrik	1	3
Central Union Gaslight Co., New York	6	54	Posen	6	54
Charlottenburg	32	288	Plauen i. Voigtl	6	54
Chemnitz	27	243	Odense	9	72
Coblenz	13	117	Randers	4	36
Darmstadt	12	108	Remscheid	3	27
Danzig	20	180	Rostock	6	54
Dresden II.	14	126	Rixdorf	12	108
Dresden III.	10	90	Stettin	21	189
Drontheim	2	18	Stockholm	24	216
Düsseldorf	8	72	Strandvej	4	36
Esslingen	3	27	Trieste	18	162
Elberfeld	5	45	Winterthur	8	72
Frederiksberg	27	233	Witten	4	36
Flensburg	6	54	Wittkowitz	4	31
Gera	9	81	Wien (Vienna)	186	1674
Genf	7	63	Zürich	32	288
Göttingen	10	90	Berlin-Tegel	40	360
E. & J. Gutmann, Wien	2	6	Nürnberg	32	288
Haag (The Hague)	9	81	Plymouth	8	72
Haarlem	12	108	St. Gallen	6	54
Hamburg, Billwärder	24	216	Enschede	8	72
Heilbronn	10	90	Total	1144	10,263

The Weiss-Zurich and Rothenbach-Bern Patent **Coal-Storage Machinery.** The De Brouwer Patent **Coke Conveyor.** The Drory and Riegel-Patent **Charging Apparatus.** The Burgmann Patent **Self-Sealing Expansion Joints** for **Ascension Pipe Sockets. Mouthpieces,** with self-oiling eccentric levers. **Mouthpieces,** with baffle-plates and insulation for reducing the radiation of heat on inclined retorts. **Ascension-Pipe Stopper,** for the prevention of explosions in retort-ovens.

Designs and Estimates given on application. Inquiries solicited.

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[Advertisement Supplement to the "Journal of Gas Lighting," &c., Dec. 22, 1903.

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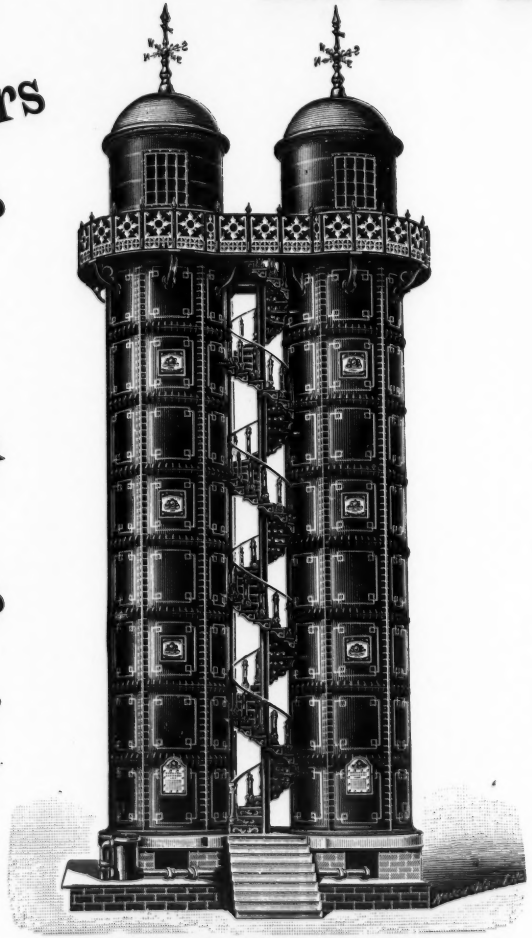
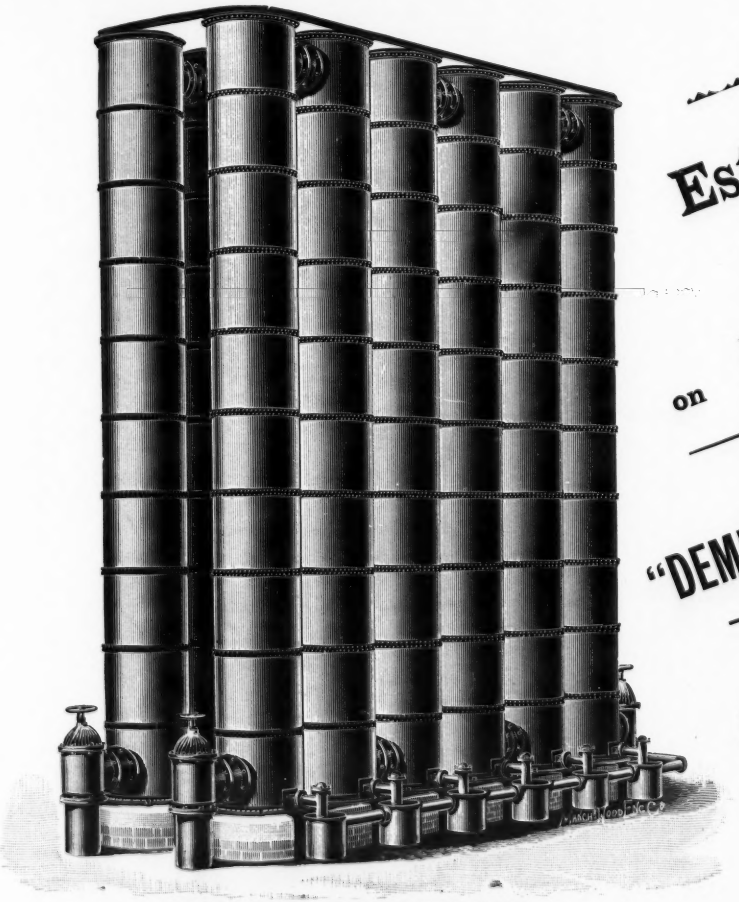


TOWER SCRUBBERS.



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